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VIEWS, NEWS AND INTERVIEWS.

A Brooklyn electrical man tells a story of a hayseed from up the State who, embarrassed by the strange sights and sounds of Brooklyn streets, became dazed in trying to pass in front of a Fulton street trolley car and was knocked down and rolled over by the front platform of the car. Just as the farmer went down the motorman yelled to him to "Look out!" The old fellow turned over on his back and answered, "Why? Are you coming back?"

While a representative of the ELECTRICAL REVIEW was in Boston the other day visiting the offices of the Frank Ridlon Company his conversation with Mr. Ridlon was interrupted by a telephone call for the latter. Mr. Ridlon's end of the talk was somewhat as follows:

"Hello! Hello—hello! Yes, this is Ridlon. What is it? . . . . What? . . . . Stop it? . . . . You want it *stopped?* . . . . Why don't you throw the switch? . . . . Is this a joke? . . . . Oh! certainly, certainly. We'll send a man right over. Good-by."

"Well, that beats me," said Mr. Ridlon, turning to the REVIEW man. "Here's a fellow got a motor he can't stop, and wants us to send a man over to stop it for him. He says the motor runs a freight—here, Smith, run over to Kelly's and stop his motor for him—elevator, and she's running the car up and down like thunder, and he wants her stopped. I've doctored a good many motor complaints in my time, but this is the first case I've had where a man wanted a motor stopped. Generally they want us to start 'em or tell why they don't keep on running forever."

The following death notice appeared among others in the New York *Herald* for December 29:

HEITMANN.—CARL AUGUST JENS HEITMANN, of Hamburg, Germany, aged 59 years, 10 months and 22 days, at his residence, No. 344 Marcy avenue, Brooklyn, December 26, of injuries caused by trolley accident, December 17.

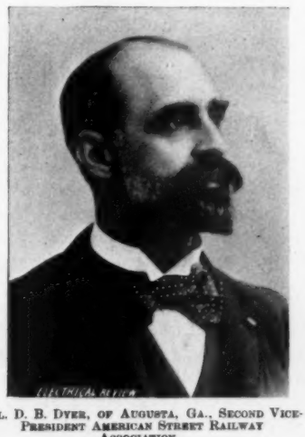
Funeral services Tuesday, December 29, at eight p. m. Interment private.

It is believed that this is the first time that such a reason has been given as the cause of death in a notice of this kind.

If there be any consolation to the criminal in the knowledge that his labor is benefiting the community in general and himself to a limited extent, a scheme said to be under the consideration of the prison authorities ought to have his best wishes, observes a London contemporary. It is asserted that several of the jails in and around London are to be lighted by electricity, and that the inmates are to have the honor of generating it themselves by means of dynamos attached to a special treadmill, whose points are at present the subject of anxious thought and experiment on the part of experts in the manufacture of such things. Why not? It would be a saving to the country and a partial solution of the difficulty of prison labor, which must either be exasperatingly unprofitable—and therefore punishment for its own sake—or a more or less unfair competition with free labor, which suffers in proportion as prison-made wares are put upon the market.

MR. CHARLES S. SERGEANT, OF BOSTON, FIRST VICE-PRESIDENT AMERICAN STREET RAILWAY ASSOCIATION.

A crowd of gamblers were gathered in by the New York police one night recently, in spite of the electric protection which they had installed. Captain Vredenburgh and his detectives have been trying to get into the place for several months past, but were always foiled by electric buzzers with which the building was fitted, throughout. Detective Hahn had all the electric wires cut the previous night, and he and Detective Armstrong wore rubber overshoes when they ascended the dark stairway, followed by a lot of policemen. That the raid was a success is doubtless due to the fact that the police force of our reform administration includes sleuths who are amateur electricians.



COL. D. B. DYER, OF AUGUSTA, GA., SECOND VICE-PRESIDENT AMERICAN STREET RAILWAY ASSOCIATION.

MR. C. F. HOLMES, OF KANSAS CITY, MO., THIRD VICE-PRESIDENT AMERICAN STREET RAILWAY ASSOCIATION.

The Vice-Presidents of the American Street Railway Association.

At the last annual convention of the American Street Railway Association, held in St. Louis in October, 1896, the following officers were elected for the ensuing year:

President—Robert McCulloch, vice-president and general manager Cass Avenue and Fair Grounds Railway Company, St. Louis, Mo.

First vice-president — Charles S. Sergeant, general manager West End Street Railway Company, Boston, Mass.

Second vice-president—D. B. Dyer, president Augusta Railway Company, Augusta, Ga.

Third vice-president—C. F. Holmes, general manager Metropolitan Street Railway Company, Kansas City, Mo.

Executive committee—H. M. Littell, vice-president and general manager Metropolitan Street Railway Company, New York city; H. P. Bradford, general manager Cincinnati Inclined Plane Railway Company, Cincinnati, Ohio; Charles H. Smith, superintendent Troy City Railway Company, Troy, N. Y.; Harry Scullin, vice-president and general manager Union Depot Railway Company, St. Louis, Mo.; George B. Hippee, general manager Des Moines City Railway Company, Des Moines, Iowa.

Secretary and treasurer—Thomas C. Penington, treasurer Chicago City Railway Company, Chicago, Ill.

The ELECTRICAL REVIEW has already published a recent portrait and biography of President McCulloch, and presents herewith portraits and brief sketches of the careers of the three vice-presidents of the association.

Mr. Charles Spencer Sergeant, general manager of the West End Street Railway Company, of Boston, and first vice-president of the American Street Railway Association, was born in Northampton, Mass., in 1852. He received his education in the public schools of that city. His business career was begun in steam railway work. After some 13 years' experience in various capacities in steam railroad employment, Mr. Sergeant was chosen general auditor of the West End Street Railway Company in 1887, upon the consolidation of the several street railway companies of Boston. He was subsequently chosen second vice-president and

afterwards general manager of the West End Street Railway Company, which position he has held since 1892. During his nine years of street railway service the system of Boston has been converted from horse to electric power and its traffic has largely increased, the West End company now operating nearly 300 miles of track, on which its cars perform a service of 70,000 miles daily. Mr. Sergeant is one of the most progressive and best known street railway men in the country, and his official connection with the American Street Railway Association will be a great advantage to its membership.

Col. D. B. Dyer, second vice-president of the American Street Railway Association, is a native of Illinois, having been born near Joliet, where he received his early education. He also completed a course at the State Normal University. In 1865, at the close of the war, he returned to Joliet, but a spirit of adventure led him West in 1869. He connected himself with the Indian Department, and was placed in charge of many tribes of Indians, including the Modocs, Cheyennes and Arapahoes. Colonel Dyer was one of the 60,000 that crossed the line into Oklahoma the day that territory was opened to settlers. He organized the city government of Guthrie and was elected its first Mayor by a population of 18,000 assembled there the first day. In 1889 Colonel Dyer moved to Augusta, Ga., where he and his associates have invested over $1,000,000. He is now at the head of the Augusta Railway Company, also an electric light company, and manages the largest modern office building in that city. He is also director in the Port Royal Company and president of the Young Men's Business League, of Augusta.

Mr. Charles F. Holmes, third vice-president of the American Street Railway Association, and general manager of the Metropolitan Street Railway Company, of Kansas City, Mo., has been connected with street railway work since he was a boy 15 years of age. At that time his father owned the Kansas City & Westport Horse Railroad (the first street car line ever built in Kansas City), and Mr. Holmes started in driving a car on this line. He drove for some six or eight months when he went into the car house, doing car repair work, and from there to the office as cashier. In 1887 the Kansas City & Westport Horse Railroad was changed from horse to cable and a new company formed, known as the Grand Avenue Railway Company. Of this company Mr. Holmes was elected general manager, which position he has held through the various consolidations up to the present time. In April, 1894, the Grand Avenue Railway Company and the Kansas City Cable Railway Company were brought together under the name of the Kansas City Cable Railway Company, Consolidated. Mr. Holmes was largely instrumental in effecting this consolidation as he was also in uniting the Kansas City Cable Railway Company, Consolidated, and the Metropolitan Street Railway Company into the Metropolitan Street Railway Company, Consolidated, in June, 1895. This road has a total mileage of 135 miles; 62 cable, 60 electric and 13 horse.

The Lighting and Transportation Systems of London and Paris.

Gen. C. H. T. Collis, Commissioner of Public Works, of New York city, has recently returned from a visit to London and Paris. He makes a most interesting statement of his observations in the New York *Sun* of December 30. The following is an abstract of the article:

The illumination of Paris, both by gas and electricity, is in charge of private corporations. One company supplies all the gas consumed in Paris for all purposes, while there are at least half a dozen electric companies having monopoly charters for certain districts. The gas mains are all laid in the sewers, and the electric light conductors are laid under the sidewalk. The price of gas is about $2.04 a thousand cubic feet. As a result, small hotels still supply their guests with candles and charge them in the bill. Larger hotels use electricity, but I saw none using gas. For municipal purposes, however, the price is a little over $1. The lamp-lighters are appointed by the city authorities, but paid by the gas company. Strangers who are accustomed to confine their view of Paris to the grand avenues and boulevards, and the passages with their brilliant little shops, carry home with them the impression that the French metropolis is the best lighted city in the world, but this is far from being the fact. Those streets which are continually upon dress parade are superbly lighted, it is true, but the streets in the densely populated parts of the city, inhabited by the poorer classes, are as dingy as any streets I have ever seen. In some of them there is only just sufficient light to escape total darkness. Whether this is due to the fact that the gas companies get only half rates for street lighting or to government economy, I do not know, but I am sure that similar streets in New York are better lighted.

The transportation system of Paris by omnibuses and tramcars, whether drawn by horses or other motive power, is in the hands of the Compagnie Générale des Omnibus, under a monopoly charter expiring in 1910. From three to five years ago special charters were granted with the consent of the Compagnie Générale des Omnibus to the Tramways de Paris and the Compagnie Sud, but within the last 18 months the latter companies have been absorbed by the parent organization, as is usual. The total mileage of omnibus lines of all routes is 132, and the total mileage of streets used by these different lines is 101. The difference is accounted for by some omnibuses traversing the same streets. The total mileage of tramway lines of all routes is 184, and the total mileage of streets occupied by tramways is 124. As all tramway lines are double track, the total mileage of single track tramways is 248. Paris, unlike New York, is comparatively circular, being from seven to eight and one-half miles in diameter and with a circumference of 27½ miles of forts.

The omnibuses and cars of Paris are made to accommodate a certain number of persons—those supplied with seats and the four standing places on the rear platform. When these places are filled the sign "complet" is shown on the car and the signal given to the driver, who then will stop for nobody to get on until signaled by the conductor that somebody wants to get off. "Correspondance" or transfers are only available from regular stations along the route of the transportation lines, and all omnibuses or tramways, whether full or otherwise, stop at these stations. Passengers arriving at a station and wishing to take a certain other line of omnibus leaving that station go to the station master upon arrival and get a ticket marked with a number, and when the required omnibus arrives the number of vacant places is called by the conductor; those having the first numbers take the first places until that omnibus or tramcar is "complet," and persons holding the following numbers have to wait for the next car. This sometimes necessitates a wait of 15 minutes, but to the Frenchman this is not a serious matter, whereas an American would chafe under it and perhaps go crazy.

The lighting of London, like the supply of water, is in the hands of private corporations, much to the regret of the authorities. The cost to the city is about 56 cents a thousand cubic feet for gas. The cost of electric lighting I did not ascertain, but as there is very little of it, it was not material. Some parts of London are well illuminated, but this is owing more to the lamps than the power of the gas or the number of lamp-posts. The designs of the lamps are not only ornamental, but they get more light out of the same amount of gas than any others I have seen. Perhaps the handsomest are those on Northumberland avenue, near Trafalgar square, which consist of a group of three globes set in bronze cups and capped with coronets; the whole surmounting a very ornate post about 20 feet high. But the ordinary street lamp, found in the chief streets of the metropolis, is also most attractive. It is about the size and shape of a lady's parasol, the interior of the roof being white glazed, and the glass kept beautifully clean. The effect of long rows of these lamps placed at short intervals is brilliant. Nevertheless, no street lighting in Paris or London excels the Edison lamps on Fifth and Madison avenues for beauty or illumination. In localities remote from the hotels and private residences, where the humbler classes dwell, the lighting is not so good as in similar localities in New York, though the fogs of London render the best illumination essential.

The omnibus and cab system of London is as near perfection as can be obtained. For the 'bus, of course, street railways have been substituted with us, but the cheap cab will inevitably come, when smooth pavements encourage competition. Up to December 31, 1895, the last return I was enabled toget, there had been licensed 2,714 omnibuses, 7,425 hansom cabs, 3,536 four-wheelers and 1,099 street cars. In addition to these means of transit there are the Metropolitan and the District underground railway systems, one making a tour of the city on an outer circle and the other on an inner circle. I used this several times while in London. A person familiar with it can save about 15 minutes an hour in getting from one place to another. The stations on these railways being inconveniently distant from the business centers, however, the people prefer the omnibuses, which can always be reached within a block or two. To remedy this a central line is now being constructed, starting from the Bank of England and running under Oxford street, along the northern side of Hyde Park and Bayswater road to Uxbridge, in a straight line right through the center of London. The company constructing this line is applying for a charter for another parallel line running from the Bank under Picadilly and Kingsbridge road to Kensington. So, you see, the subject of more rapid transit and better facilities to enable the people to work in one place and sleep in another is not confined to New York.

ELECTRIC LIGHT FLASHES.

The Westport Water and Electric Light Company, of Connecticut, have elected president, William L. Coley; vice-president, William H. Childs; secretary, John S. Jones; treasurer, Francis W. Marsh; auditors, W. H. Childs, Charles Fable.

At a meeting of the stockholders of the Little Falls, N. Y., Electric Light and Power Company, the Little Falls Gas Light Company and William Henry White & Company, the ratification of the consolidation of these companies into one was accomplished; the new company to be known as the Little Falls Electric Company.

O. B. Suhr, chief engineer of the electric company, who proposes to build a large electric plant in the Madison canyon, Mont., has completed the preliminary surveys and expects to begin active operations with the early Spring. The scheme contemplates the development of 40,000 horse-power, which will be transmitted to Butte.

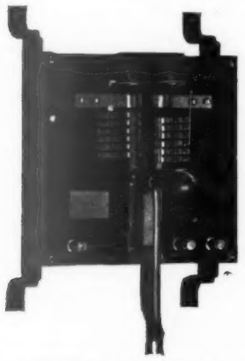
There is considerable talk of the "Consolidated" Railroad going into the electric lighting business in New Britain, Ct., in competition with the Central Railway and Electric Company, which now has a monopoly of this business here. The city pays about $10,000 yearly for street lights, and it is at present working under a verbal contract, which can be terminated at any time.

The Doane Multiple Rheostat.

The Frank Ridlon Company, of Boston, are manufacturing a new form of rheostat, which has been examined by experts in such matters and is claimed to be built on the only correct principle. The patents for this important appliance were granted April 14, 1896. The resistance is thrown in multiple into the circuit, each resistance rod being of such resistance as to allow only a certain amount of current to pass through it. These rods are thrown in one after the other until the whole amount of the current required passes through the rheostat. It is then short circuited through low resistance copper strips.

Each resistance rod is therefore doing only its share of the work, no matter how much current is passing through the rheostat, as by throwing in resistances in multiple the carrying capacity is thereby increased as the resistance is decreased.

No wire is used for resistance, but a specially prepared solid composition graphite rod is used. These rods are tested at a very high heat and are virtually indestructible. It is practically impossible to burn them out or destroy them when used in the work for which they are designed. The manufacturers state that "if by accident one of the resistance rods becomes injured from any cause, the rheostat can still be used, as it is impossible to cause an open circuit, while with the old style series rheostat, if any part of the resistance material is burned out or injured, the rheostat becomes useless."



The Doane Multiple Rheostat.

These rheostats are built to fully cover all insurance requirements.

The company are now manufacturing motor-starting rheostats with or without the automatic release, motor speed regulators, theater lamp dimmers and dynamo field rheostats. Mr. Frank Ridlon, who possesses a very wide acquaintance in the electrical field, is at the head of the Frank Ridlon Company, and Mr. E. W. Kellogg is the enterprising treasurer. Mr. Doane, the ingenious inventor of this rheostat, is associated with the company.

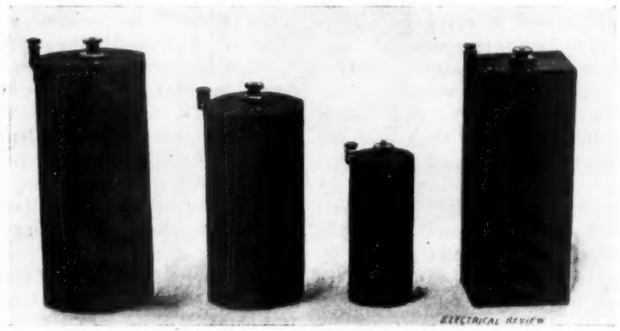
A Combination Electric Heater and Foot-Warmer.

The convenient form of electric heater, illustrated on this page, is a new design recently perfected by the Globe Electric Heater Company, of Philadelphia. It consumes one-half ampere of current on 110-volt circuit. It is 20 inches long, six inches high and adjustable to any lamp socket.

The "Vim" Dry Batteries.

The accompanying illustration shows several forms of the "Vim" dry battery, manufactured by A. L. Bogart, 22 Union Square, New York city. The "Vim" dry battery varies in a number of details of structure from other similar cells, such variation insuring a large and comparatively continuous output of current, rapid recuperation and absence of local action on open circuit. Four sizes of the Vim battery are to be had, the electro-motive force of each being the same (1.5 volt), but the current varying with the size. No. 1 gives eight to ten amperes on short circuit, being the largest, and is suitable for operating coils, gas engines or large gas lighting plants. No. 2 is the standard size and is intended for all ordinary work, giving six to eight amperes. No. 3, or the "Midget," is but four inches high, affords three to four amperes, and through its lilliputian size is available for bicycle bells, lighting of kerosene lamps or wherever but small space is permissible. It may also be used in testing outfits or medical batteries for either direct current or electrolytic purposes.

No. 4 corresponds in strength to No. 2, but, being square in section, may be laid on its side, as in electric clocks, etc. Other special sizes will be made to order to suit the convenience of customers.



Types of the "Vim" Dry Battery.

Before putting these cells on the market Mr. Bogart made a careful test of them for various practical purposes. Amongst others may be mentioned the operating of a two-inch Ruhmkorff coil during the entire continuance of the last American Institute Fair in this city, four of the No. 1 cells being used in connection with Welsbach lights ignited on the series system.

Mr. A. E. Burland, superintendent of the Newport, R. I., Illuminating Company, was a recent visitor to New York city.

PERSONAL.

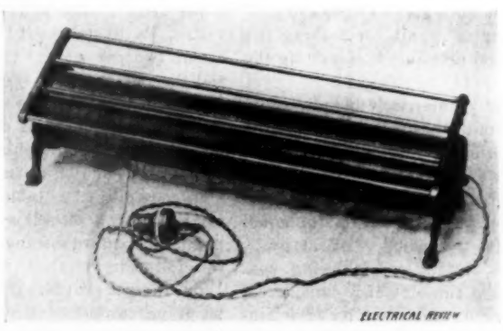
Mr. E. B. Baker, of New Haven, Ct., general superintendent of the Southern New England Telephone Company, was a visitor to New York city last week.

Mr. Francis H. Doane, of the Frank Ridlon Company, Boston, visited New York city and vicinity last week in the interest of the new rheostat which he has produced for his company.

Mr. John T. McRoy, manufacturer of the McRoy vitrified terra-cotta conduit, was a New York visitor last week. His conduit is in use by the Chicago Telephone Company and the Chicago Edison Company, and has many points of merit.

Maj. Loren N. Downs, president of the Lansing City Electric Railway Company, of Lansing, Michigan, recently spent a few days in New York and was a welcome visitor at this office. Major Downs has large interests in the electric railways of Michigan and is extending several of his roads.

Mr. W. A. Stadelman, general manager of the Bristol Belt Line Railway, Bristol, Tenn., is remembering his friends in the electrical field with passes over his road good during 1897. The passes are properly countersigned by Mr. John J. Haley, and everything is in proper form for a free ride on this belt line.



A Combination Electric Heater and Foot-Warmer.

Two sons of Mr. Eugene F. Phillips, president of the American Electrical Works, Providence, R. I., are now taking an active part in the management of the business. Mr. F. N. Phillips has assumed the position of treasurer, made vacant by the resignation of Mr. W. A. Hathaway, and Mr. E. Rowland Phillips has been appointed superintendent of the works at Phillipsdale. The Electrical Review extends its congratulations to these two young gentlemen on their advancement, and wishes them full success in their new duties.

KIND WORDS.

"GREATLY PLEASED."

To the Editor of Electrical Review:

I have been greatly pleased with the Review during the past year and wish it success in the future. I shall continue one of its many subscribers.

Leon C. White.

December 30, 1896.

RECOMMENDED BY THE SUPERINTENDENT.

To the Editor of Electrical Review:

The superintendent of the Walton Electric Light Company has praised your paper very highly and I want to see a sample copy. E. E. F.

Walton, N. Y., December 28, 1896.

A SUBSTANTIAL CHRISTMAS REMEMBRANCE.

To the Editor of Electrical Review:

I shall in a day or two send you 10 new subscriptions with the names of the managers to whom I desire the Electrical Review sent.

Morris F. Tyler, President.

December 24, 1896.

"A VERY GOOD PAPER."

To the Editor of Electrical Review:

The Electrical Review is a very good paper, and I find it very interesting. D. B. Tanner.

December 23, 1896.

DOESN'T WANT TO MISS A SINGLE COPY.

To the Editor of Electrical Review:

My subscription must be about out, and, as I should not like to miss even one number of the Electrical Review, I inclose check for renewal.

William Rollins.

December 30, 1896.

WOULD NOT BE WITHOUT THE "REVIEW."

To the Editor of Electrical Review:

Inclosed please find check ($3.00) three dollars, paying subscription to your valuable paper until September, 1897. It is one I would not be without.

E. R. Pease.

December 29, 1896.

"A HAPPY NEW YEAR"—TWO YEARS.

To the Editor of Electrical Review:

I send you herewith $6 for your very valuable paper and wish you and staff a Happy New Year.

J. Harris Rogers.

Bladensburgh, Md., Dec. 29, 1896.

UP-TO-DATE.

To the Editor of Electrical Review:

I think the Electrical Review is thoroughly up-to-date in every respect. D. W. H.

Brooklyn, N. Y., Jan. 4.

Mr. Clifford C. Baker, president of the Topeka Railway Company, Topeka, Kas., was a welcome visitor at the Electrical Review office last week. Mr. Baker reports a very excellent year for his railroad, although the past month in Topeka has been so pleasant that the citizens prefer walking, which is another occasional reason for street railways to lose patronage.

THE THEORY OF THE WIRING TABLE.

READ BEFORE THE CHICAGO ELECTRICAL ASSOCIATION, BY THOMAS G. GRIER.

Wires are used to form an easy and direct path for the distribution of the electric current, as pipes are used for distributing gas or water to places at a distance from the source of supply.

The sizes of pipes are determined upon the basis of the distance and the quantity of material sent through them. Wires, as well, must have some distinct size depending upon the circumstance governing different conditions.

It is necessary to make calculations in order to ascertain the size of wire, and to shorten and to simplify this work of calculation wiring tables have been compiled.

A wiring table gives at once the result in the commercial size of wire, and when the proper table is at hand no multiplying or dividing, no figuring, no application of a formula is required.

In all substances there exists some unknown obstruction to the flow of an electric current. The technical name given to this obstruction to the passage of an electric current is resistance. It is not known what causes this resistance, but by experiment the extent to which it exists in any substance can be ascertained and measured.

It is known how in any substance the amount of resistance may be varied by altering the dimensions, also as to the amount of energy necessary to overcome any resistance.

The theory of the wiring table is simply one of proportioning resistances.

The first point to be considered is how is the resistance varied in any substance? The law states that the resistance of any substance varies directly as its length and inversely as its cross-section.

This law has been verified by experiment and is universally accepted as a law of nature.

The resistance varies directly as the length of any given substance means that if the length of a wire is doubled the resistance is doubled, and three times the length means three times as much resistance.

The resistance varies inversely as the area of cross-section means that if the area of a wire is doubled, that is, if there is just twice as much metal for a given length of wire, the resistance is decreased one-half.

If the area is increased three times, the resistance is decreased to one-third.

In a wire of a given substance, if the length is doubled, and at the same time the area is doubled, the resistance remains the same; or if the length is increased to three times as great, and at the same time the area is increased three times, the resistance remains the same.

From this application of the law already referred to it can be seen how it is possible to vary the size of a wire so that the resistance remains constant for any length, or how the resistance may be changed to suit any condition or circumstance.

The next consideration is the action of the electric current. The pressure is measured in volts, and the rate of flow is measured in amperes. The volts are all used up in forcing the amperes against the resistance.

The resistance (if it were all in the wire) would mean a total loss of the electrical energy, because the volts would be used in doing work from which no results were obtained.

It is necessary, therefore, to make the resistance of the wire which conducts the current but a proportion of the total resistance, the rest of the resistance of a circuit being that which exists in the lamps and the other devices or apparatus which convert the electrical energy into commercial forms, as light, power or heat.

To so compile a table and calculate the sizes it is necessary to consider the relation which exists between the unit of resistance, the ohm; the unit of pressure, the volt, and the unit of current, the ampere.

One ohm resistance requires the pressure of one volt to transmit one ampere. Two ohms require two volts to transmit one ampere. One volt will transmit but one-half an ampere over two ohms, and 100 volts will transmit 10 amperes over 10 ohms.

This is Ohm's law, which, when given in the form usually found in text books, is as follows:

The rate of flow, or current, measured in amperes, is equal to the volts divided by the ohms. The volts are equal to the amperes multiplied by the ohms, and the ohms are equal to the volts divided by the current flow or amperes.

Knowing the relation of resistance to the flow of currents and to the pressure, the next point to be considered is the substance used for the wires, and ascertain the amount of its resistance for a given length and size, to be used as a unit for making the calculation necessary in compiling the table.

Copper commercially and physically represents the best conductor for the transmission of the electric current. A dollar's worth of copper will conduct a greater amount of electric current than any other metal of equal value with the same loss of energy.

In the illustrations following, copper will be the substance considered, as the wiring tables used for ascertaining the size of wire are for copper wire.

The units by which wire is measured are the circular mil and the foot.

The circular mil is the area of a circle whose diameter is one one-thousandth of an inch.

The foot is a unit familiar to all.

The unit of wire then would be a wire one foot long, the area of which is one circular mil, and the resistance of this unit of copper wire is between 10 ohms and 11 ohms, depending upon the temperature of the wire.

10.6 ohms may be assumed as the resistance which approximates closely to the average at ordinary temperatures. Taking this as the basis for compiling a wiring table, it is known that to send an ampere through this unit of wire would require 10.6 volts. For, as stated in Ohm's law, the volts must equal the ohms multiplied by the amperes. But in every-day problems the known quantities are the volts and amperes, and the calculation is to find wires of proper resistance to suit the conditions.

The resistance, or the ohms, must equal the volts divided by the amperes. To solve this problem the volts are divided by the amperes, and we have the resistance.

The resistance varies as the length and inversely as the area. It is the area of a wire which is desired, and one the resistance of which will equal the resistance found by dividing the volts by the amperes.

The resistance of one foot of copper wire one circular mil in area equals 10.6 ohms.

The resistance of any wire is equal to its length multiplied by 10.6 and this divided by the area. Now it is known that the volts divided by the amperes equal the resistance, and the volts divided by the amperes are, therefore, equal to the length of the wire multiplied by 10.6 and divided by the area.

In any problem of wiring we have the number of volts and amperes, also the distance the current is to be transmitted, and the only thing remaining to be found is the area.

To find this, we multiply 10.6 by twice the distance, or the total length of wire (in multiple arc work there is one outgoing wire and the return circuit, which makes the total length of wire double the distance), and multiply this by the amperes and divide the product by the volts used, which gives the area of the wire.

The volts used are not the total volts of the system, but the volts lost in the wire. If the problem is given so many per cent loss, it would mean a per cent of the total number of volts. To illustrate: If the wire is to use up two per cent of the pressure, and the voltage of the system was 50, then you would divide by two per cent of 50, or one volt, or, if the pressure was 100 volts, you would divide by two per cent of 100, or two.

In compiling a table, let it be assumed for a 50-volt system for a regular increase of distances of 10 feet, the following method is pursued: First, the per cent loss is ascertained, let it be two per cent. This, then, would be one volt. Then one ampere will be considered, first, as the total current flow, and the following calculations would be made: 10.6 would be multiplied by 10 feet, and by two to get the length of the wire, and this multiplied by one ampere and the product divided by volts lost, or, in this case, by one, which would give us an area of 212 circular mils. This would be the size of a wire necessary to allow one ampere to be transmitted 10 feet with one volt loss (or two per cent of 50 volts).

The next calculation would be for 20 feet distance, and as the resistance of the wire must remain the same, the area first found, namely, 212 circular mils, must be doubled as the distance has been doubled. For 30 feet to keep the resistance constant, the area is increased three times, and so on until the limit of the table, say 200 feet, is reached, when the area will be increased 20 times, as the length has been increased by that amount.

Then the same method will be continued for two amperes; namely, multiplying by 10.6 by the distance, and by 2 to get the length of wire, and this multiplied by amperes, and the whole divided by the volts lost. This is continued until the area for all the wires for each of the distances and for the various number of amperes has been determined.

As it is necessary to multiply 10.6 by the (distance multiplied by two) in every instance, 21.2 is used instead, and the straight distance used. The whole resolves itself into the simple formula:

$$\frac{21.2 \times \text{distance} \times \text{amperes}}{\text{Divided by volts lost}} = \text{area of wire.}$$

When these areas are found the commercial sizes of wire are inserted in the table which are nearest to the size found, but always larger, never smaller; that is, if the area found in the calculation came between a 0 wire and a 00 wire, the 00 wire would be the size used in the table.

Telephone Relays.

[*From the London Electrical Review.*]

Ever since telephony became a practical science, the idea of a telephone relay has been a favorite problem with numerous inventors. It may be questioned, however, whether these inventors have really grasped what is involved in the problem they have attempted to solve, and whether they have been working in anything more than a haphazard way. Let us consider what are the conditions involved, and whether, as matters stand now, there is any prospect of a successful telephone relay being devised. The conditions are very simple. We speak against a diaphragm on which is arranged a microphone, and this diaphragm vibrates with a certain intensity, an intensity which is perfectly perceptible, and which can be felt if the finger is held against it. The result of this vibration is to produce in the diaphragm of the telephone receiver at the further end of the line an effect which is certainly not perceptible to the touch. In other words, the receiver diaphragm vibrates with much less intensity than does the transmitter diaphragm. How, then, can a microphone arranged on this receiver diaphragm possibly cause a variation sufficient to retransmit or to relay along another section of line equally long, say, with the first one? In order that I may do so, the receiver diaphragm, on which the microphone relay is arranged, must vibrate with the same intensity, or nearly so, as the original transmitter. Unless, therefore, the diaphragm of a receiver can be made to vibrate with an amplitude somewhat approaching that of the transmitter, telephone relaying seems to be impracticable.

The Use of Static Machines for X-Ray Work.

Coincident with the development and perfection of a series of fluoroscopes and screens and other x-ray apparatus, G. A. Frei & Company, 17 Bromfield street, Boston, have constructed several sizes of static machines especially adapted for x-ray work, and it is claimed by some scientists that this machine not only produces the same result, but gives a clearer and sharper definition and at a very much lower cost, both as to the original expense and the matter of operation in comparison to the Ruhmkorff coil.

The illustration, Fig. 1, gives a general view of the "Frei" machine.

The revolving plates of hard rubber are 17 inches diameter, mounted upon ball bearings and are geared up in the ratio of 1 to 18; that is, one turn of the handle gives 18 revolutions on the plate. The machine can thus easily be run at a speed of 2,000 revolutions a minute, even by hand. The result of this high speed is a remarkably steady discharge and, consequently, steady glow in the Crookes tube. The best speed, it has

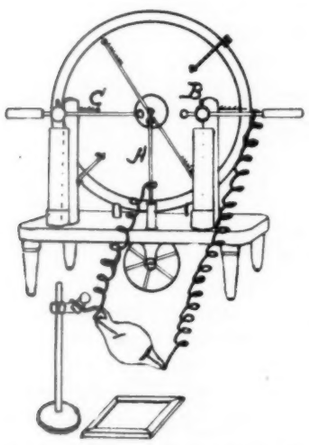


Fig. 2.—Arrangement of Static Machine for X-Ray Work.

been determined, is between 1,500 and 2,000 revolutions a minute; if run at a higher rate there is a discharge across the plates and only a short spark can be obtained.

The driving gear is under the base, and the hand-wheel may be taken off and a pulley substituted, if it is desired, to run the machine by power.

Mr. G. A. Frei, in this connection, has furnished the Electrical Review with the best methods of using static machines for x-ray work, as the result of his experiments, which to those not familiar, will be clear by reference to the drawing, Fig. 2.

1. See that the revolving plates revolve freely between the stationary plates and the collecting combs without touching either, and that the condenser jars make good contact in and outside.

2. Connect the terminal or "anode" of the Crookes tube to the spark gap post A and connect "cathode" to B, move C so that its terminal ball will be about three-quarters of an inch from terminal ball A, then start the machine. Let the spark jump across between B and C at first, then pull out B about four or five inches and the current will go through the tube.

3. Observe whether the glass frame around the "anode" shows greenish fluorescence; if so, the connection is right; if not, change the wire connecting the "cathode" or concave terminal over from B to C and use B for the spark gap; or reverse the wires on the tube, but keep the machine going while the change is being made. With the connections properly made the tube shows high fluorescence only between the terminals, while the space behind the terminals is in comparative darkness.

4. The length of the spark gap must be regulated to suit the vacuum in the tube. When a tube having a low vacuum is used, the gap must be long, in some cases over two inches long; while with a tube having a high vacuum the gap must be short to get the best results. Draw out the gap till the tube begins to flicker, then push the rod back just enough to prevent flickering in the tube; this will be found the point at which all tubes, high or low vacuum, give the maximum of rays.

5. Never run the tube "backward" or with wrong poles; it raises the vacuum rapidly and the tube gives off no rays when run this way.

6. Don't screw down the charging brushes too hard; it will be sufficient to let them touch the rubber plates.

7. Always keep a dish of fused chloride of calcium in the case; this will readily take up the moisture from the air and the machine will always be in working order, regardless of the weather.

TELEPHONE NEWS AND COMMENT.

The New York & Pennsylvania Telegraph and Telephone Company are making arrangements to offer to the people of Erie, Pa., a one-way telephone with complete metallic circuit service at a rental of $12 per year for residence and $18 for business places, unlimited use.

Fig. 1.—The "Frei" Stanley-Toepler-Holtz Machine for X-Ray Work.

Newport, R. I., has refused the Providence Telephone Company the right to use the streets for 10 years, and place wires under ground. The city was to get one per cent of the gross receipts, the use of wires for fire and police service and half the schedule rental for office service.

Rumor says that an independent telephone system will be established in Pittsburgh during the new year at an expenditure of $1,000,000. Ordinances have been introduced in both Pittsburgh and Allegheny councils by the Home Telephone Company to secure franchises in these cities.

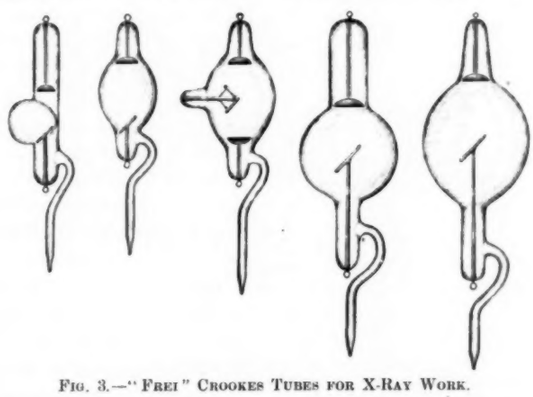


Fig. 3.—"Frei" Crookes Tubes for X-Ray Work.

The Wisconsin Telephone Company entertained its resident subscribers at Milwaukee with a special musical entertainment, transmitted over the telephone lines on the evening of December 29. The entertainment commenced at 8.15 P. M., and all the subscribers who desired were connected with the central and greatly enjoyed the music supplied by experts with mandolins and guitars

A contract has been signed between the officers of the Mutual Telephone Company and the Connecticut Telephone and Electric Company, of Meriden, Ct., for the construction of long-distance lines and a switchboard system for Des Moines, Iowa. The most improved switchboard will be put in. The company proposes to commence work in the Spring.

At the annual meeting of the Fulton Valley, N. Y., Telephone Company, the following officers and directors were re-elected: President, J. W. Canaday; vice-president, Charles Bouck; secretary, J. H. Weckle; treasurer and manager, C. W. Vroman; directors, J. W. Canaday, Chas. Bouck, C. W. Vroman, A. G. Rosekrans, W. H. Chapman, M. C. Wright, W. W. Burgett.

According to official statements, in 1894 the number of telegraph messages sent in the United States was 75,000,000, while the messages sent over telephones numbered 10 times as many, or 750,000,000. While the latter figure includes messages sent over short-distance wires from one part of a city to another, the official reports show that the use of the long-distance telephone is increasing at an amazing rate.

General Manager Cutter, of the Iowa Telephone Company, is authority for the statement that work will commence early in the Spring on an extension of the copper metallic long-distance telephone line west from the Mississippi River. The line is to be built west from Davenport along the Rock Island road, with spurs to Ottumwa and Oskaloosa and possibly to Cedar Rapids and Marshalltown, to a point some distance west of Des Moines.

At the recent annual meeting of the stockholders of the Southern States Telephone Company, held at Norfolk, Va., the following gentlemen were elected directors for the ensuing year: S. Q. Collins, A. E. Krise, L. D. Starke, Jr., Norfolk; Hon. Edwin Warfield, James D. Mason, Seymour Mandelbaum, Henry Bergunder, J. A. Fink, C. E. Fink, Maryland. These directors elected the following officers: President, Charles E. Fink; vice-president, L. D. Starke, Jr.; treasurer, Edwin Warfield; secretary, Frederic S. Axtell.

The fourteenth annual report of the Erie Telegraph and Telephone Company will be quite an interesting document and cover details in regard to operations and conditions of not only the Erie company, but of the sub-companies not heretofore published. The report will contain statement of income of the three sub-companies and the Erie company in detail for 1894, 1895 and 1896, balance sheets, growth of subscribers by exchanges from 1893 to December 31, 1896, increase of exchanges, as well as a statement as to the cost of plant and of repairs and maintenance. The report will contain maps of the toll lines, showing the number of circuits, wire and pole mileage operated between each city and town, which now exceeds 10,000 miles. As the document will contain all the statistical information for 1896, it will be impossible to issue it earlier than April 1.

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Special Notice to Advertisers.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.

NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

NEW YORK, JAN. 6, 1897.

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This journal is the only weekly publication in the United States that gives comprehensively the news of the electric railway field. The recognition of this fact by this great industry is shown in the constant increase of subscribers among street railway men. It is also a good sign of the advance of electrical influence in the field of steam railways, that nearly every mail brings the names of steam railway men as new subscribers to the "oldest electrical weekly."

The way to overcome the "busy" response of the telephone operator to the party calling for connection is to put in other telephones and not accuse the faithful exchange attendants of deception. This fact is now better understood in New York city, and several additional direct lines to the central office are being put in in railroad, newspaper and other busy offices. The telephone has become such a business necessity and advantage that the constant increase of subscribers is taxing the facilities of many of the telephone companies in the large cities to promptly build the new lines.

The formation of the new Siemens & Halske–Fort Wayne Electric Corporation brings another powerful electrical manufacturing company into the field. Furthermore, its leading spirit, Mr. R. T. McDonald, is a gentleman of keen business acumen and has a thorough knowledge of the principles and details of the whole business. No one better than he realizes what competition means, and yet, with the splendidly equipped manufacturing plants controlled by the new company, as well as the technical and business ability at its command, Mr. McDonald will undoubtedly force his company to the front rank on purely meritorious grounds.

The total destruction by fire of the Newark, N. J., People's Light and Power Company's plant on December 29 was a calamity for that city and for the owners of the company. Fortunately the insurance was ample to cover the loss. The prompt response of the several manufacturers to calls for new apparatus and supplies was an illustration of the rapidity with which men connected with the electrical industry can work when occasion demands. The service of the company at this writing is almost wholly restored to normal, though in a temporary manner. Great credit is due to Mr. Jackson and his efficient staff for the prompt manner in which they met such a serious emergency.

THE FRANKLIN FUND.

One of the institutions of Boston, of even more practical possibilities than the Sacred Codfish, is the Benjamin Franklin Fund. When Franklin died, in 1790, he bequeathed in his will to the inhabitants of Boston £1,000 sterling, to be loaned in small amounts to needy apprentices of the town at an annual interest of five per cent. It was stipulated that this plan was to be followed for a period of 100 years from the time of Franklin's death, when the fund, with whatever accumulations should have accrued to it, should be applied to specified public objects. In his will Franklin directed that the management of this fund should be under the selectmen of the town, "united with the ministers of the oldest Episcopal, Congregational and Presbyterian churches of Boston." At the present time the fund amounts to $360,000.

Last week the appointment of trustees to administer this fund was considered in the Probate Court by Judge Robert Grant. The Board of Aldermen of the city of Boston would like to appropriate the whole fund to the erection and maintenance of a trades school. The matter before the court was a petition from the Mayor of Boston and the aldermen for the appointment of themselves and the Revs. Brooke, Duane and McClelland, as the ministers of the three oldest churches mentioned in the will, as trustees to administer the fund. Since 1822, when Boston became a city, there have been no selectmen, and it is a question whether or not since that year there have been any trustees in a legal sense for this fund.

While in a matter of this kind, involving such a large amount of money and with such an important object in view, it is best to move well within the law and within the specifications stipulated by the donor of the fund, yet it is to be hoped that a technical obstacle may not act to prevent the early use of this fund for the establishment of a trades school. In view of the prominent place now occupied by the electrical industry, it would seem extremely desirable and important that this trades school, when established, should include in its scope instruction in the elementary principles of electrical science and practice. Such a step would be all the more fitting in view of the fact that Franklin's electrical work has become historical. Were he alive and able to control the disposition of this fund himself, it is not at all unlikely that he would devote a large portion of it to electrical instruction.

THE PEOPLE'S LIGHT AND POWER COMPANY'S PLANT IN NEWARK, N. J., DESTROYED BY FIRE.

RAPID RECONSTRUCTION—SERVICE RE-ESTABLISHED IN SEVEN DAYS—THIRTY-SEVEN DYNAMOS BURNED—BRUSH, WESTINGHOUSE, FORT WAYNE AND STANLEY APPARATUS SENT BY SPECIAL FREIGHT—HEROIC WORK OF MESSRS. JACKSON AND GAFFNEY.

In just 168 hours after the fire in the power-house of the People's Light and Power Company, in Newark, N. J., which absolutely destroyed every piece of electric machinery, amounting to 37 dynamos, seven engines, the switchboard and all the power-house apparatus excepting the boiler-room, the officers of the company had brought from Cleveland, Pittsfield, Fort Wayne, Pittsburgh and other points, by special fast freight trains, new machinery, set it in order and operated every light in the city, numbering 14,000 incandescent and 1,650 arc lights, so that the city, on the seventh night, knew not that such a fire had occurred.

When President Philip N. Jackson and Superintendent John J. Gaffney saw that the fire could not be quenched in time to save the plant, and before it was even gotten fairly under control, telegraphic instructions were sent to the Brush factory, in Cleveland; Westinghouse, in Pittsburgh; the Stanley company, at Pittsfield, Mass.; the Fort Wayne Corporation, in Fort Wayne, for the immediate forwarding of new electric machinery by special freight.

The fire took place on Tuesday evening, December 29, and on Wednesday evening two Brush machines, which had been near at hand, were in operation at the burned plant, and a line which carried current for 200 arc lights had been run to the power-house at Harrison, N. J., and four machines installed at the old Boyd street power-house were running.

Not one of the entire 37 dynamos can be restored, and the destruction of three Ball engines, two made by Macintosh & Seymour and two of the Westinghouse type, was complete. The estimated loss on the dynamos and engines alone is placed at $180,000.

The fire was attributed to some defective wiring, or a "cross" or "ground," in the first reports by the daily press, but during an interview with Mr. John J. Gaffney, the company's general superintendent, he said to a representative of the ELECTRICAL REVIEW that it was not caused by an electric current or defective wires, as no circuit-breaker was found to be opened.

The remarkable rapidity with which the plant was restored was partly due to the fact that President Jackson, whose family are prominent railroad people, was able to command special transportation facilities.

The Underground Trolley in New York City.

The technical staff of the Metropolitan Street Railway Company, New York, is busily engaged in the work of preparing the plans and details of the underground trolley work soon to be begun on Fourth, Sixth and Eighth avenues. A modification of the Lenox avenue underground system, or rather an improvement that experience there has taught, will be adopted. One and probably two new power-houses will be erected. The company is fortunate in having already power-house facilities that can be utilized.

Contracts for part of the work have been made with the following companies for the material and apparatus named:

General Electric Company—Generators.

Babcock & Wilcox Company—Boilers.

Pennsylvania Iron Works Company—Engines.

Pennsylvania Steel Company—Rails.

Wm. Wharton, Jr., & Company—Switch rails.

President H. H. Vreeland is devoting his energies very largely to this work, while general manager H. M. Littell looks closely after the operating of the great Metropolitan system. Work on the underground lines will be begun the first moment that Spring weather will permit, and if there is no serious delay the citizens of New York will see the horse cars on these three avenues replaced by the trolley cars before the end of the year 1897.

Even the Interpreter Couldn't Believe in the Telephone.

Some years ago, while visiting the Spokanes, Gen. Philip Sheridan related to the Indians, through an interpreter, the wonders of the railroad, and then waited to see what effect the revelation would have upon them.

"What do they say?" he asked the interpreter.

"They say they don't believe it," was the answer.

Sheridan then described the steamboat, and the interpreter repeated this.

"What do they say to that?" the General again asked, seeing the Indians' faces all impassive.

"They say they don't believe that, either."

Then the General gave an account of the telephone, and told how a man at the end of a long wire had talked to a man at the other end of it. The interpreter remained silent.

"Well," said the General, "why don't you interpret that story to them?"

"Because I don't believe that story myself," answered the conscientious man.—*San Francisco Argonaut.*

It is reported that General Manager Gorke has resigned his position with the Electric Engineering and Supply Company, of Syracuse, N. Y., and will be succeeded by Mr. May.

The Niagara Transmission Celebration.

The Cataract Power and Conduit Company, of Buffalo, N. Y., has issued invitations to a large number of prominent people to be present at a dinner in the Ellicott Club, Buffalo, on Tuesday evening, January 12, to commemorate the introduction of Niagara power into Buffalo. It is fitting that an historic episode of this kind should be so accentuated, and the celebration in view promises to be everything desirable.

A French X-Ray Fake.

A French audience was curiously victimized by a lecturer who advertised to discourse on the ill effects of wearing tight corsets and to illustrate the evils with "experiments on two live subjects." The hall was crowded, but as soon as it became evident that the "live subjects" were to be conspicuous by their absence there was a general stampede. The audience declined even to look at the Roentgen-ray pictures that the lecturer offered as a substitute.

Michigan Traction Company.

The Michigan Traction Company, of Kalamazoo, Mich., has been incorporated, with a capital stock of $500,000. The incorporators are L. N. Downs, F. N. Rowley, E. E. Downs, Kalamazoo, Mich.; Geo. J. Kobusch, Otto Von Schrader, St. Louis, Mo. This company will probably acquire the rights and property of the Citizens' Street Railway Company, of Kalamazoo, and build 23 miles of new road, connecting Kalamazoo and Battle Creek, Mich. Franchises have been applied for in the several towns between these two cities, and a survey has been made and rights of way secured so that work can be commenced early in the Spring. It is intended to have the new road in operation by July 1. The incorporators above named are the principal owners and managers of both the Kalamazoo and Battle Creek roads.

The B. & O. Offices in New York.

The Baltimore & Ohio Railroad Company now possesses the handsomest offices in New York city, and probably in the United States. They have just been fitted up at 434 Broadway, and Thursday afternoon, December 31, were occupied for the first time. A reception and luncheon were tendered to brother railroad officials and others, and was attended by over a thousand visitors. The new offices are particularly attractive and roomy, well lighted and tastefully decorated, and instantly favorably impress he visitor.

Among the officials of the company present at the opening were: General Eastern Freight Agent Mosher, Freight Traffic Manager Wight, Eastern General Superintendent Van Smith, General Eastern Passenger Agent McCarthy, J. H. Maddy, chief press agent of the Baltimore & Ohio, and General Eastern Agent Wells, of the Baltimore & Ohio Southwestern.

SIEMENS & HALSKE—FORT WAYNE ELECTRIC CORPORATION.

Mr. R. T. McDonald Will Head a New Combination of Large Dimensions.

THE SIEMENS & HALSKE ELECTRIC COMPANY OF AMERICA, OF CHICAGO, AND THE FORT WAYNE ELECTRIC CORPORATION, OF FORT WAYNE, IND., HAVE CONSOLIDATED, WITH A CAPITAL STOCK OF $6,500,000—NEW COMPANY ASSURED OF THE SUPPORT OF SIEMENS & HALSKE, OF BERLIN, CAPITAL, $20,000,000—THE CHICAGO AND FORT WAYNE PLANTS BOTH TO BE OPERATED.

The Fort Wayne Electric Corporation, of Fort Wayne, Ind., and the Siemens & Halske Electric Company of America, of Chicago, have consolidated, with a capital stock of $6,500,000.

Mr. R. T. McDonald, of the Fort Wayne company, will be the controlling spirit of the new company, which will probably be known as the Siemens and Halske-Fort Wayne Electric Corporation.

The new company will also have the support and backing of the great Berlin house of Siemens & Halske, whose capital is $20,000,000.

Both the plants at Fort Wayne and Cicero, a suburb of Chicago, will be operated, and the new company will make every kind of electrical apparatus and supplies, including electric railway equipment and cars both for surface and elevated service.

There was a rumor in electrical circles about a month ago that Mr. McDonald had been offered the management of the Brush Electric Company, of Cleveland. This deal, it is said, contemplated the closing of the Fort Wayne plant, and on this account Mr. McDonald declined the offer.

The new company will maintain principal offices in both Fort Wayne and Chicago, besides a large number of branch offices. Its manufacturing facilities are unlimited, and it will at once enter the field as a well equipped competitor in every branch of the electrical industry except telephony.

The Edison Electric Illuminating Company of New York has declared a quarterly dividend of one and one-half per cent on capital stock, payable February 1 to holders of record January 14, at which time transfer books will be closed, and reopened February 10.

Brooklyn has 12,994 street gas lamps and 3,431 electric lights. The total cost of the gas for the streets and public buildings for the year 1896 was less than $185,000, while the electric lights cost $357,698.

Electric and Other Power Transmissions.

[*From the Engineering and Mining Journal.*]

The recent successful beginning made in the transmission of power by electricity from the plant at Niagara Falls to the city of Buffalo is, we believe, the beginning of an economic change of great importance. At present a force equivalent to 1,000 horse-power is sent to Buffalo, and is used in operating the street railroads of the city; but the Niagara Falls company is under contract to increase the transmission to 10,000 horse-power by June next, with the probability of a still further growth as the arrangements for distributing and using the power are completed. So far the transmission has worked very smoothly and successfully, but it has not been in operation long enough to reach a definite conclusion as to the proportion of loss and the percentage of the force actually utilized in work performed. The main fact is that the supply of a large city with power from a distant source on a large scale has actually been begun. Long-distance transmission of power to single plants has been carried on for some time, but not for general distribution, as is contemplated in Buffalo, and will certainly be carried out in that city within a few months.

Now, there are very few of our large cities which are situated like Buffalo, within a comparatively short distance of a natural source of almost unlimited power, such as is found in Niagara Falls. Unless the practical radius of transmission is increased by new devices or inventions, the number of towns which can be supplied from water-powers is limited. We have, however, a number of large cities which are within easy reach of coal mines which could supply the fuel for great power plants, which might be erected on such a scale as almost to equal the natural water-powers in economy of production. There is every probability that in this direction will be found our next great industrial development in this country.

We have before pointed out the great economies to be realized in this way, and it is hardly necessary now to go over them again in detail. The consumption of fuel and its conversion into either gas or electricity at points close to the mines would not only save the cost of the preparation for market now required and of the transportation; it would avoid a large part of the waste and loss which now occur at the mines, as substantially all the coal taken out could be consumed, and with it probably a large part of the culm and dust piles which are now found at almost every mine. The economies of steam or gas production on a large scale could be fully realized. The cost of storing coal and of distributing and delivering it to individual consumers in the cities, which amounts in the aggregate to a very large sum, would be saved. While, of course, the expense of transporting and distributing gas or electric power would be considerable, we believe that it would be trifling in comparison with that of handling the coal itself as is now done. And in addition there is to be considered the labor and cost of firing with coal, the removal of ashes and the like, matters difficult to estimate because they are so much subdivided, but certainly amounting to a great total, to say nothing of the difficulties attending such work in a large city.

Of course, it will require time to bring about such a change, especially as it will be opposed by many large interests. The great sums invested in railroads, which are chiefly supported by the carrying of coal, the large amounts also invested in the present machinery of the coal trade and the other interests which would be affected by such a change, would all be ranged against it, and their opposition would take time to overcome. As in all important industrial changes, injury to a few would be the immediate result, but this would be far overbalanced by the general benefits secured.

Whether gas or electricity will be the form most generally adopted for the transmission of power as well as heat and light, admits of much variation in opinion, and the field is certainly open for discussion. The comparatively recent development of electricity, and the probability that great advances will be made hereafter in that direction, present an element of uncertainty in the problem. At present it seems as if in many cases the conversion of coal into gas and its transmission by pipes to the points where it is needed would be, upon the whole, the best solution; but there are plenty of grounds upon which the electrical people may contest this point.

The use of gas fuel is familiar to many of our people through the general employment of natural gas in Pittsburgh and in the towns and cities of the gas belt in Ohio and Indiana. In many manufacturing establishments also the use of the Taylor and other forms of gas producers is becoming common, while the gas engine is rapidly coming into general use. An instance of the introduction of producer gas for ordinary city use was given in our last issue, and other cities will soon follow the precedent there set.

Should gas be generally adopted in this way it would be practicable to supply it to a very large part of our cities and towns by piping direct from the mines. There are only a few districts, such as New England, in the East, and a large section of the Pacific coast, which are beyond reach of such pipe-lines. In those districts a great part of the area could be supplied from plants located on the seacoast or at points where coal could be delivered at very low rates. This is the plan proposed in Boston, which will probably soon be carried out; it is already on trial at Halifax, in Nova Scotia.

The subject is so large that it can be treated but very slightly in a single article, but we hope that discussion may be called out. Undoubtedly many engineers recognize the fact that a change is coming, and some are preparing themselves accordingly.

OUR CANADIAN LETTER.

PARRSBORO, N. S.—The question of lighting the town by electricity is now under consideration.

PARRY SOUND, ONT.—A project has been mooted to construct an electric railway from this place to Ahmic Arbor.

COLLINGWOOD, ONT.—A second engineer for the electric light plant is wanted. Address Thos. Bassett, superintendent.

GUELPH, ONT.—The by-law to provide funds for purchasing an electric light plant will be submitted to the rate-payers.

ST. THOMAS ONT.—Messrs. Hoffmann and McLellan, of Berlin, are negotiating for the purchase of the St. Thomas Street Railway.

CHATHAM, ONT.—The City Council have decided to submit a by-law to the rate-payers for the expenditure of $15,000 for a civic electric plant.

MONTREAL, QUE.—The Montreal Street Railway Company has arranged for six tons of turkey and three tons of plum pudding, amounting to eight car loads, for free distribution among its employés, as a Christmas gift.

MONTREAL, QUE.—The Temple Investment and Loan Company has been organized by Messrs. G. A. Cox and J. W. Flavelle, of Toronto, and John Torrance and James McBride, of this city. The company will construct and maintain tramways, electric roads and electric lighting systems.

OTTAWA, ONT.—The Canadian Pacific Railway Company gives notice that it will apply to Parliament at next session for an act confirming an agreement dated the 16th day of March, 1896, between it and the Hull Electric Company, whereby the Canadian Pacific Railway undertook to lease what is known as its Aylmer Branch to the Hull Electric Company for a period of 35 years, at a rental of $5,000 per annum.

J. A. C.

Montreal, December 30.

LITERARY.

We have received from the director of the United States Geological Survey, "Seventeenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1895–96, Charles D. Walcott, director. In three parts. Part III—Mineral Resources of the United States, 1895; Metallic Products and Coal, David T. Day, chief of division."

In *McClure's Magazine* for January are reproduced all the known portraits of Benjamin Franklin, painted or drawn from life. There are 15 of them, covering a period of 31 years, and they are the only authentic documents whence the present generation may derive any accurate conception of Franklin's features. Presented all together, as they are here, with excellent notes giving the history of each picture, they have an interest and value that can not be estimated. Mr. Charles Henry Hart, the editor of the series, more than proves his competency; and the groups of life portraits of Washington, Hamilton and other great Americans that are promised in succeeding numbers of the magazine will now be awaited eagerly.

The January number of *Scribner's Magazine* marks the beginning of its second decade with an entirely new dress of type. From the very first issue *Scribner's* has been an accepted leader in modern magazine literature and art. The plans for 1897, as already announced, are the most extensive and attractive ever prepared for this magazine. While always choosing the best, independent of nationality, it is to be noted that, for the coming year, the leading features of *Scribner's* will be American. There will be notable series of articles also on The Conduct of Great Businesses in America, and on Undergraduate Life in American Colleges. The first article on Great Businesses is devoted to "The Department Store." The author, Samuel Hopkins Adams, a skillful journalist, devoted many months to a study of the subject, and was given every facility to acquire accurate information by the leading men in these great stores—in New York, Chicago and Philadelphia.

Electrical Bank Protection.

It is asserted that the holding-up of the Bank of New Amsterdam in daylight less than a year ago caused bank officials in New York city to take extra precautions to avoid similar experiences. One bank, which is a depository for large amounts, has announced its intention to spend some of its large surplus for new electrical devices to protect it from daylight hold-ups and midnight burglars. It was stated last week that expert electricians have arranged an invincible system of burglar alarms adapted to all sorts of contingencies. Every window and door is connected with burglar alarm companies, and so are certain squares in the floor. There are electric buttons in various parts of the bank so arranged that if an official is confronted by a revolver and ordered to throw up his hands he may obey and at the same time give an alarm by stepping on an electric button in the floor. Every bank and safe deposit company in New York is now protected by various electrical devices, in addition to its night watchmen. It is probable, however, that a certain number of false alarms will be given by careless officials which may lead to the condemnation of the electrical devices. Anyway, a burglar who has any respect for his profession should be able to keep up with the tricks of the electrical trade

Car Company Insolvent.

The Laconia Car Company, of Laconia, N. H., has been petitioned into insolvency.

ELECTRICAL REMINISCENCES—EDISON'S ELECTRIC LIGHT.

BY WALTER P. PHILLIPS.

In 1876 I remember that Edison and I crossed on a Jersey City ferry-boat together, and he asked me if I had read a recent paragraph in the *Commercial Advertiser* to the effect that the Brooklyn Bridge would be in working order about the time that Edison succeeded in subdividing the electric current. Replying that I had not, Edison continued:

"That is one of the smart things that these fellows write, and I think Amos Cummings, in the *Sun*, and Ned Fox, in the *Herald*, are responsible for it. They have been recently printing a lot of rot about the Wizard of Menlo Park, and people are stimulated by that sort of thing to expect everything in a minute. One of them—Fox, I think—says I am a genius; but you know well enough I am nothing of the sort, unless," he added thoughtfully, "we accept D'Israeli's theory, that genius is prolonged patience. I am patient enough, for sure. As for the electric light, I've been neglecting it for a lot of other things—my telephone, the phonograph and so forth but," he added confidently, "I'll subdivide the electric current when I get around to it, never fear. You wait and see."

Well, I have waited and I have seen. It is no part of my purpose to speak of the surpassing loveliness of the electric light. None but a poet could do it justice. Those of you who visited the World's Fair and saw the display in the Electricity Building, who beheld the rim of fire which disclosed against the sable wing of night the location of the Ferris Wheel, or who saw the blazing dome of the Administration Building, the brilliantly lighted lagoons, the wonderful search-lights and electric fountains, or who, in short, have seen the electric light in its less conspicuous phases in the hotels and private residences of your own cities, will readily concede that Edison did not overstate his ability when he assured me that he would subdivide the electric current when it suited his convenience to do so. With the advent of the electric light, with its generators and other paraphernalia, great strides were immediately made in applying this practically new-found power. Aside from the development of the thing itself, electric lighting on a large scale led to the propulsion of street cars by means of electricity, and it has now been applied to almost everything. But perhaps the benefits of its introduction are larger in connection with the trolley car than in any other direction. The dingy tenements of the town are being deserted every day for the little homes lying along the routes of the trolley cars. On almost every country road leading to and from towns and villages the electric car, combining the cheapest possible form of conveyance with a rate of speed which puts the horse to shame, is making its rounds and bringing comfort and an improved condition of life to hundreds upon hundreds. The anxious mother, eager to make secure the health of her children, the toiling father of the family and the little ones find greater happiness, a more perfect freedom and better health through the change from the crowded houses of the poor to the wayside cottages,

FIG. 1.—THE KENT ALTERNATING-CURRENT MOTOR.

many of them surrounded by gardens, and some of them half hidden by climbing vines. The charming Autocrat of the Breakfast Table, snugly ensconced in his library at Beverly Farms, wrote satirically in the *Atlantic Monthly* of the Broomstick Train, and the late Mr. Curtis, living in peace and quietness on Staten Island, lifted up his voice in simulated anger in the Easy Chair when the electric car for the first time passed by his residence like a flash, and went bounding up the road to an adjacent village. But none knew better than Dr. Holmes and he whose delightful philosophy so many of us read month after month, during many years, in *Harper's Magazine*—none knew better than they that this disturber of their day-dreams was destined to bring manifold blessings to their fellow-men. They showed by their example that they believed the country, which God had made, is a better place for woman, child and man than is the city, which has been created by human hands, and in their sympathetic hearts they rejoiced, no doubt, over the improved condition of their fellow-men, which was inevitable as an outcome of this wonderful agent for the depopulation of the tenement and the upbuilding of little homes scattered by the roadside between the towns. Formerly the toilers in foundry, factory and workshop lived within the shadow of the great buildings in which so much of their time was spent. At night they breathed the smoke-laden atmosphere hovering over their miserable quarters; their wives and children existed in a polluted atmosphere destructive to their moral and mental health, and often fatal to their physical welfare. To-day, in a very considerable measure, the environment is vastly bettered; the children play in the sunshine, their senses know the odor of flowers, the beauty of clear skies, the music of birds and the melody of the winds soughing through nodding trees. Their moral as well as their physical natures must profit by all this. They will make better, stronger and happier men and women for having a means at hand of making the tenement house no longer their only refuge. The father works more cheerfully than before, because he knows that when the evening has come he will be out in the country, whisked there so rapidly that, before he knows it, the forges, the chimneys, and all the unlovely things with which he is surrounded when at work, will be left behind, to remind him no more of their existence until, refreshed by sleep and reinvigorated by rest in a pure atmosphere, he cheerfully retraces the course of his evening journey, and with a heart more hopeful for the change, goes about his work, singing, may be, because there is something different, something better, awaiting him when the day is done. Edison, more than any other man, has brought about this change, because he pointed the way which others have followed with such grand results.

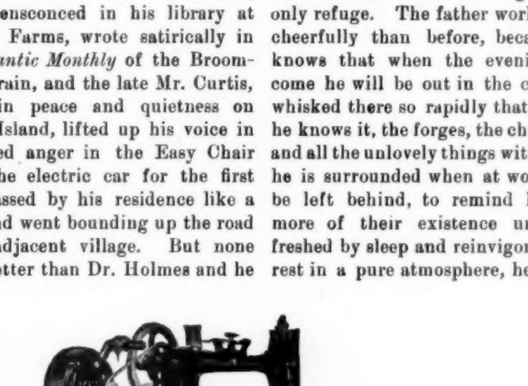


FIG. 2.—THE KENT ALTERNATING-CURRENT MOTOR ATTACHED TO SEWING MACHINE.

A Strowger telephone system is being installed at Aiken, S. C.

The Kent Alternating Sewing-Machine Motor.

The extended use of the alternating system of electric lighting has created a large demand for small power specialties for such circuits. The Kent Electric Manufacturing Company, of Worcester, Mass., have lately been bending their energies in this direction, and one of their results is the sewing-machine motor illustrated in the accompanying engraving.

The great difficulties encountered in this work are the small starting torque and the non-variable speed of these motors. Both of these obstacles are overcome in the device shown. The motor is mounted on a base, to move with a lever, connected to the treadle of the machine, and the speed regulation is obtained by tightening and slackening the belt. By this method any desired speed may be maintained. In this way even more perfect regulation can be obtained than by direct current, as the speed can be changed in an instant, and the brake, which touches on the circumference of the balance-wheel, stops the machine instantly.

A switch located on the base is turned on when the operator sits down to the machine. The motor is thus started without a load, and is running constantly while the machine is in use. It is compact and neat in appearance.

The company are about to put on the market a new alternating-current electric dental engine which is said to be noiseless, and with perfect speed regulation.

Electric Railway Company of the United States.

The Electric Railway Company of the United States, whose office is at 1 Broadway, New York city, has applied to the Supreme Court through Directors Cephas Brainerd, Henry M. Field, Stephen D. Field and others for the voluntary dissolution of the corporation, and Justice Truax has appointed John Hone, Jr., referee in the matter. The company has done no active business for two years. There are a large number of stockholders, the principal ones being the Rev. Henry M. Field, 3,872 shares of the 20,000; Frederic F. Thompson, 1,000; Stephen D. Field, 495; Stephen J. Field, 375. The liabilities are $33,250, of which $20,000 are bonds issued to the late David Dudley Field. The assets consist of three patents, cash $41, office furniture and old materials.

The town of Hudson, Mass., voted some years ago to go into municipal lighting, but then reconsidered. The Electric Lighting Company then asked the court to compel the town to take its plant as stipulated in law governing municipal ownership. The Supreme Court has decided that the town must pay $15,000 for the plant, which is said to have considerably depreciated in value during the period of litigation. The town must also pay about $5,000 as the cost of the legal contest, and is so sick of the whole business that it proposes to buy electric lights from Marlboro.

The Heilmann Locomotive.

[*From the Electrical Review, London.*]

In the new Heilmann locomotives which are shortly to be tested, the general appearance will be, at one end, that of an ordinary locomotive boiler carried on a plate frame, and at the other end an equally long closed-in vehicle similarly carried. The plate-frame platform is continuous, and deeper at the center. Each end is carried on a bogie of four axles, the wheels as close as possible to each other, and only 1.16 metre diameter, and with a wheel base of 4.1 metres. The center pins of the two bogies are 11.300 metres apart; the total wheel base is thus 15.400 metres.

The engine will, in fact, be a very big affair, fully deserving of the name of a traveling central station, which has been applied to it. The principle of subdivision is carried very far. Each of the eight axles carries a motor, so that we have an express locomotive with 16 driving wheels, and we may compare it with the English Great Northern engine of two driving wheels and six carrier wheels. There is no coupling of the various pairs of wheels, but every motor runs independently. There are to be two six-pole generators of, together, 2,000 amperes capacity at 455 volts, but for a short period their combined output may be 4,000 amperes. An enormous grate surface of 36 square feet (3.34 m^2) is provided with 177 square feet of fire-box surface and 1,818 feet of tube surface, in 351 tubes of 1.77 inch outside diameter, the tubes being 12.46 feet long.

Separate excitation of the fields of both the generators and motors is given by a 28 horse-power Willans engine driving a four-pole dynamo.

At 62 miles per hour the power of the eight motors is 1,000 horse-power. This represents a torque of 748 pounds at the tires, but the maximum torque is 2,640 pounds at the tire, the diameter of which is 45.67 inches.

The new Heilmann engine will thus have 12 cylinders. Though ordinarily the motors are in multiple, they can be grouped in two series of four each for maximum tractive effort at slow speed. The axles pass through the sleeve which carries the motor armatures, and the driving is by spiders. This, of course, will relieve the rail and wheel of the unsoftened pounding effect of the heavy armatures, but it will introduce another trouble. The vertical play of the springs, producing more or less eccentricity of the armatures and axles, must compel the armature to vary its speed of rotation instantaneously, and we think, for high-speed work, trouble may arise to the coils of the armature. This has been foreseen and guarded against, if we may judge from the illustration, by placing springs between the wheels and the spiders in order to ease the shock of sudden change of speed. It is assumed that the indicated horse-power will be ,350, the steam engine efficiency 90 per cent, that of the generators 95 per cent and of the motors 90 per cent. Then with a two per cent loss in the conductors, the net efficiency is 75.4 per cent, so that there is 1,000 horse-power at the tires and 657 horse-power at the draw bar.

Compared with the Empire State Express engines, the indicated horse-power at 70.5 miles was 977, but 1,120 had been once shown. The train hauled was 340,000 pounds. That estimated at only 62 miles to be hauled by the Heilmann is 355 tons. The American engine had only 27.3 feet of grate surface, however, and the comparison can hardly be carried through. What would an English locomotive do if only fitted with a grate measuring 9 feet by 4 feet? We think it would beat the Heilmann engine.

We still fail to see that for the purpose of rapid acceleration the complication of the Heilmann engine can be justified, and Mr. Ward Leonard, who describes the engine in the *Electrical World*, seems to see its principle as useful in tunnels, because the combustion of the fuel being more perfect the sulphurous fumes will be reduced, and so on. This sort of a plea is very poor, and had better have been left out. So long as the furnace discharges at the funnel the sulphur will be all there, no matter what the combustion is like, and the only reduction would be in the matter of dirt and soot. We certainly doubt any improvement being possible over the results of English locomotives when fitted with the brick arch, nor do we think the Heilmann engine will be very clean unless it have a brick arch. It seems ridiculous to talk of the Heilmann engine as suitable for the Baltimore tunnel in place of the present electric locomotives there used. The present motors have no fires, but are purely electric, picking up current in the usual way. Why advocate the Heilmann in such a place, when electricity was adapted simply to abolish furnaces being carried through the tunnel in a state of high combustion? We believe, now, the steam locomotives are hauled through with fires as inactive as possible.

Car Dispatching by Telephone.

The New Jersey Electric Railway Company and the New York & New Jersey Telephone Company recently closed a contract by which the former will introduce a new system of car dispatching. The "white line" has five stations on its line, which extends from Hoboken to Singac, N. J., but it has been found that these stations are too far apart for the expeditious working of the road in case of delays or accidents. The new system is to control the entire road by telephone from Hoboken.

The Espersen Shade Lamp.

The Pacific Electric Company, 120 Main street, La Crosse, Wis., are manufacturing a very desirable shade lamp which should meet with great popularity among physicians, dentists, students and business men who are obliged to use artificial light. The Espersen shade lamp is arranged to be readily attached to a desk or piano, and the reflector is adjustable so that the light may be thrown in any desired direction.

Electric Railways.

The net earnings of the Metropolitan Street Railway, of Kansas City, Mo., for November were $55,499 against $54,464 last year.

The electric cars of the Chicago City Railway Company are being fitted with powerful brakes. They are controlled by a lever and are said to be a great improvement on the old-style brake, giving the motorman better control of the car.

The Consolidated Traction Company, operating in Essex, Hudson and Union counties, has purchased the franchise of the Union Traction Company, which had secured a right of way between Newark, N. J., and Hackensack. It is said that the consideration was $250,000.

Plans have been filed at the Department of Buildings for the powerhouse to be erected by the Third Avenue Railroad Company, of New York, for its new Kingsbridge road trolley line. The building will be situated on 218th street, between Ninth and Tenth avenues, and will cost $125,000.

The proceeds of new stock and bonds to be issued by the Newton, Mass., Street Railway Company will be used for Nonantum and Concord avenue extensions and new equipment and improvements at Newton in the way of grade crossings. Grades will, when completed, cost the company about $50,000.

In the Board of Aldermen on December 28 Alderman W. J. Donovan offered an order that the city of Boston endeavor to secure municipal control of the property of the West End Street Railway Company within the city limits. Mr. Donovan argued for protection of citizens from strikes, claiming that by the last strike $1,000,000 were lost by Boston business men.

A newsboy named David Kimpland got a verdict for $2,750 recently in the Supreme Court in Brooklyn, N. Y., in his suit against the Brooklyn Heights road for personal injuries. The boy alleged that when he was passing through the trolley car to sell a paper to one of the passengers the conductor dragged him back and threw him off the car, cutting his head severely.

The Chicago & Eastern Illinois Railroad has acquired by lease the Chicago, Paducah & Memphis line, running from Altamont, Ill., to Marion, Ill. General Freight Agent Felton announced that his road has taken possession of the property. A direct connecting line has been built from Shelbyville, Ill., to Altamont, a distance of 24 miles. Adequate train service from Chicago over the new line has been inaugurated.

If the experiments now being made in the shops of the Chicago, Ill., City Railway Company are successful, electric cars will travel without noise, and the whir and clatter will be bottled up and carried off by the introduction of a wooden and rubber truck. The contact between different parts of the vibrant metal has made of the truck now in use a roaring sound-magnifier. A pair of experimental trucks are now almost completed, and as soon as they are fitted to a car they will be tested on one of the trolley lines. The construction is under the direction of superintendent M. K. Bowen and master mechanic C. E. Moore.

The Chester County Central Railroad Company, recently incorporated with a capital of $600,000, will begin constructing a single-track electric line for freight and passengers between Philadelphia and West Chester as soon as the company can be financed. The Union Traction Company will, it is said, connect with the new road at some point at the city line. In the future the line will be extended to Lancaster through Oxford, Quarryville and York. Contract for the construction as far as West Chester has been awarded to the Columbia Construction Company, of New Jersey. William S. Kirk, of West Chester, is president; John S. Love, Jr., secretary, and A. Aylesworth Kite, treasurer, of the new company.

Articles of incorporation have been drawn up for the Greenbush, N. Y., & Nassau Electric Railway and Power Company. The following directors have been chosen: William H. Nichols, John F. Lape, Fred Carr and Bradford Lansing, of Greenbush; Joel T. Morey, Gardner Morey and Thomas James, Nassau; James Gray, East Albany; C. J. Smith, Bath; W. D. Barnes, Brainerds; J. H. Finnerty and Dr. S. C. Curran, East Greenbush. The directors elected: President, William H. Nichols; vice-president, Thomas E. James; secretary, Dr. Curran; treasurer, Fred Carr; general manager, John F. Lape. Executive committee, John F. Lape, Thomas James and W. D. Barnes. The road will be 17 miles long from Greenbush to Brainerds. About $10,000 of the $20,000 to be subscribed locally has been paid.

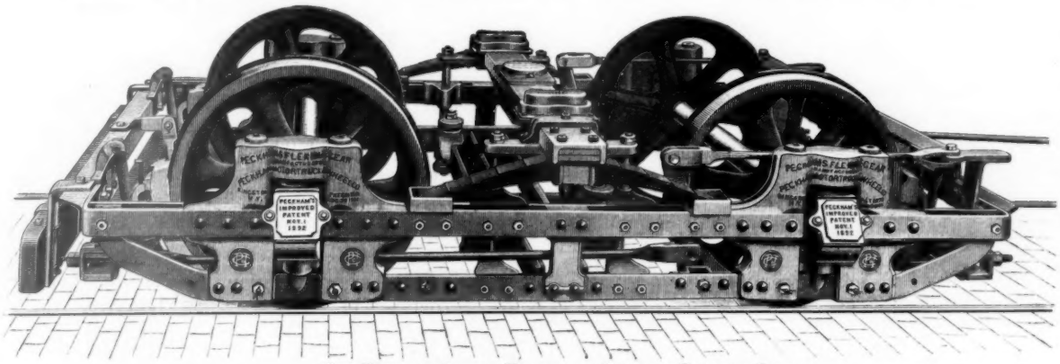
X-Ray Room in a Hospital.

The new pavilion of the New York Orthopædic Hospital and Dispensary was recently opened. It includes an X-ray outfit, which has been placed in a small dark-room on the first floor. An entire new electric plant has been put in to operate this apparatus and to furnish current for lighting. An operating table will be placed in one corner of the room, and the apparatus will be used for examining the deformities of the patients and for photographing them to facilitate their treatment. Arrangements will be made by which physicians generally may have the use of this apparatus and room at certain hours.

The Peckham Swivel Truck for Electric Railways.

Mr. E. Peckham, in designing the double-cushioned swivel truck illustrated on this page, considered the results obtained in practice on steam railroads, the truck following closely the lines of those used on the famous Empire State Express on the New York Central Railroad. The rapid extension of suburban electric lines and the demand for long car bodies in the large cities induced the wide-awake president of the Peckham Motor Truck and Wheel Company to promptly design and as promptly construct a swivel truck, of which the latest development is presented in this issue of the ELECTRICAL REVIEW. In the language of a competent authority, this truck "represents the boiled-down essence of the experience, not only of steam railroad service, but also of the last five years of electric railway service, and is remarkable for its easy-riding qualities."

The numerous street railway readers of this journal are certain to be interested in this late product of the practical hand of Mr. Peckham, and



THE PECKHAM SWIVEL TRUCK FOR ELECTRIC RAILWAY CARS.

the fact of the truck's particularly easy-riding qualities gives it a popularity exceeded by none. One reason for this quality is that the weight is doubly cushioned by the two elliptical springs and spiral springs over each box. The strong side frames, which are yet not particularly heavy, of the Peckham cantilever bridge truss form, it will be observed, have been retained. The gearing of the brake is simple and most effectual in application. The body of the car is generally 27½ inches above the rail. The wheel base is short and the space between the axles kept clear, so that it is easily feasible to mount two motors on the truck without hindrance. It is possible to quickly remove the bolster and eiliptic springs when the car is being overhauled.

This truck has been in use something over a twelvemonth and has met already with a welcome from the street railway companies that assures it a permanent place in the improved electric roads of the country, several of which have adopted it, with highly satisfactory results.

A New Telephone Factory.

The Phœnix Interior Telephone Company, of New York city, is building a new factory at 93 Washington street. It will be of brick, 25 by 65 feet, and five stories high, with a basement.

A Jovial New Year's Celebration.

In accordance with what has now come to be an annual custom, Messrs. J. W. Godfrey, F. W. Harrington and J. B. Olson invited their many friends in the electrical field to meet them at their offices, 15 Cortlandt street, New York city, on December 31 to celebrate the passing of the old year and the advent of the new. These gentlemen are all connected with the India-Rubber and Gutta-Percha Insulating Company, of which Mr. Wm. M. Habirshaw is general manager, and the invitations to their friends were issued under the four names mentioned. Nearly 400 representative men in the electrical business of New York city and vicinity were present at the ceremonies and partook of the good cheer provided for them.

The trade-mark of this firm is the national colors, red, white and blue, referring to the cores used in their various brands of wire. The cardinal red, imperial white and royal blue have come to be known as distinctive brands pertaining to the product of the India-Rubber and Gutta-Percha Insulating Company. Referring to this matter, a friend of the firm who was invited to the celebration, in sending his regrets, wrote: "The words, red, white and blue, I suppose, are intended to be read backwards; that is, 'If you feel blue, attend this racket, where you will be treated white by those who wish to paint the town red.'" As a matter of fact, there was no red paint to be seen during the festivities; indeed, the paint was quite another color. All who attended the reception thoroughly enjoyed themselves, and many expressions of good will for the red, white and blue were offered to the hosts of the day.

An Air-Brake Hand-Book.

General manager E. J. Wessels, of the Standard Air-Brake Company, 100 Broadway, New York city, has issued a very fetching little hand-book on air-brakes for electric railway cars. To any street railway man the contents are worth more than the three and one-half minutes required for its perusal.

Boston Aldermen Want the West End Road.

At a meeting of the Board of Aldermen, of Boston, on the evening of January 1, a resolution was passed without a dissenting vote, requesting the legislature for permission to purchase the West End Street Railway Company.

Welcoming the New Year at the Colonial Club.

A number of electrical gentlemen, at the invitation of Mr. E. W. Little and Lieut. Frank J. Sprague, were entertained at the Colonial Club, New York, New Year's eve. The interesting programme caused the evening to pass with delightful rapidity, and with the striking of the hour of midnight the entire audience of members and guests in the club's large theater stood up and sang "Auld Lang Syne" with a zest and joy that indicated no regrets over the passing away of the year of 1896 with all its hard times and political excitements. The programme was continued after an intermission for lunch, and a few hours later a particularly enjoyable supper was discussed by a number of those who desired to welcome 1897 with proper ceremonies.

The bright particular star among the numbers presented for the entertainment was the graceful and skillful effort of one of the club's most popular members, Mr. E. W. Little, who had consented, after several modest refusals, to give some "char-coal reminiscences." Mr. Little's début on the stage side of the footlights, in the language of the profession, was a decided hit, and his rapid and effective sketching and caricaturing provoked instant applause and compliment. Not the least attractive was the graceful opening speech and the running comment with which he accompanied his work with the crayon, accompanied ever by slow or fast music from a well coached pianist as the lines on the sketch-board developed cautiously or rapidly. Mr. Little concluded by quickly sketching a park scene upside-down, which was a mystery to all not in the secret until the board was reversed, when it was greatly applauded. General manager H. M. Littell, of the Metropolitan Street Railway Company, promptly engaged, or tried to, the services of Mr. Little to lecture before the Mutual Aid Association of his road for the enlightenment of his conductors and motormen. The offer is under advisement, as the artist has some doubts of the effective application of his "drawing" abilities to Broadway cable cars in a blockade.

Among the electrical gentlemen present, besides Messrs. Little and Sprague, were C. P. Geddes, H. M. Littell, T. C. Martin, Geo. H. Guy, E. E. Bartlett and L. Orr, and one and all will remember with keenest pleasure the departure of 1896 and the arrival of 1897.

Resolutions on the Death of H. L. Lufkin.

At the regular meeting of the directors of the Crocker-Wheeler Electric Company, held December 23, 1896, the following resolutions were passed:

Whereas, In the death of Mr. Harvey Lamb Lufkin, manager of sales of this company, we have sustained a severe loss, and

Whereas, Mr. Lufkin has been from a period early in the history of the business an almost constant associate of the founders of the company, and was an authority of wide reputation, whose thorough knowledge of his subject and devotion to the company's interest has contributed largely to its success,

Resolved, That this minute be made as an expression of our appreciation of the man and his work.

A New Field for Ruberoid and P & B Compounds.

The well known insulating qualities of P & B compounds have been found to be very valuable in a new field, namely, as an insulation for storage battery boxes. Recent experiments in this line made by the Hanover Street Railway Company, of Hanover, Germany, proved the great efficiency of the P & B compounds and the P & B ruberoid for insulation, and have been enthusiastically indorsed by the street railway company and adopted for permanent use. There is no leakage of current with this system, and batteries run for 14 hours without charging that formerly had to be recharged at much shorter periods. The ruberoid is applied in layers of felt cemented together by means of the compound under a system adopted by Siemens & Halske. It is understood that Siemens & Halske are so well pleased with the result of this new method of protection for accumulator boxes that they will urge its adoption in all their work.

The Standard Paint Company, of New York, who manufacture ruberoid and the P & B compounds, are very properly pleased with the new field which is opened up for their valuable product.

FOR SALE.

AT A BARGAIN.

14 W. P. 50 Motors.

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709 LEXINGTON AVENUE. NEW YORK.

ADVANCE INFORMATION

New Electric Railways.

NEW YORK, N. Y.—The underground trolley system is to be extended next Spring to the Fourth and Amsterdam avenue lines of the Metropolitan traction system, as well as to the latter company's Sixth and Eighth avenue lines.

NEW PALTZ, N. Y.—The franchise of the New Paltz & Highland Electric Railroad has been sold by its projector, B. Van Steenberg, to Ferdinand McKeige.

WESTBROOK, ME.—A number of leading citizens of this place and Windham are interested in securing a charter for a new electric railroad from this town to Harrison.

DOYLESTOWN, PA.—The Bucks County Railway Company has reorganized its board of directors and staff of officers. At a meeting in Philadelphia a few days ago Francis Fenimore was elected president, William Jenks Fell, treasurer, and Mr. Rambo, secretary. The other directors are Ormond Rambo, George S. Gandy and Edward B. Ives.

Electric Light and Power.

AUSTIN, TEX.—The Buchel Power and Irrigation Company, of Cuero, has been incorporated by Otto Buchel, C. August Buchel, E. A. Buchel, W. Westhoff and V. B. Proctor, for the supply of light, heat and electric motor power, or either of them, to the public by any means. Capital stock, $50,000.

BAINBRIDGE, GA.—Mayor can give information concerning construction of electric light plant.

JEANERETTE, PA.—City Clerk may be addressed concerning establishment of electric light plant.

PINE BLUFF, ARK.—The Pine Bluff Power and Transit Company has been incorporated, with W. H. Langford, president; J. B. Trulock, D. C. Bell and others, to operate electric light and power plants, etc. Capital stock, $100,000.

GATESVILLE, TEX.—The Gatesville Electric Light Company has been incorporated by H. C. Voss, D. S. Hooker, B. H. Jeames and others, to establish an electric light and power plant. Capital stock, $25,000.

LAURENS, S. C.—City Clerk can give information concerning erection of electric light plant, for which bonds have been issued.

CEDAR FALLS, IOWA—Case & Songer have been granted a 20-year franchise for establishing and maintaining an electric light plant.

LENOIR, N. C.—Board of Trade may be addressed for information concerning construction of electric light plant.

MONTGOMERY, MINN.—The James Quirk Milling Company will put in an electric plant.

HAGERSTOWN, MD.—The Hagerstown Electric Light Company contemplates the erection of an electric power plant.

THIBODEAUX, LA.—R. J. Naquin is reported to be interested in the establishment of an electric light plant.

BEDFORD CITY, VA.—The Bedford electric light plant has been purchased by John D. Langhorne, of Washington, D. C., for $10,000.

PITTSBURG, TEX.—The Mayor may be addressed for information concerning the erection of an electric light plant.

MELROSE, MASS.—Town Clerk may give information concerning establishment of an electric light plant.

ONEONTA, N. Y.—Electric light plant is being constructed.

WORCESTER, MASS.—The Worcester Corset Company is installing an isolated electric light plant.

COUNCIL, CT.—City Clerk may be addressed concerning proposed establishment of electric light plant.

JACKSONVILLE, FLA.—The Jacksonville Electric Light Company is preparing to install the machinery for its new plant, and will shortly place orders for the equipment.

COLUMBUS JUNCTION, IOWA—J. A. Protzman is interested in establishment of an electric plant.

FORRESTON, ILL.—City Clerk can give information concerning construction of electric light plant.

JACKSONVILLE, FLA.—The Jacksonville Electric Light Company will purchase new electric light plant equipment.

MILWAUKEE, WIS.—A municipal electric lighting plant is being established.

New Telephone and Telegraph Companies.

JERSEYVILLE, ILL.—The subscribers to the new telephone line between this place and Hardin have agreed to organize as a corporation, to be known as the Union Telephone Company.

NORTH BALTIMORE, Md.—A new telephone company has been incorporated at this place with $10,000 capital.

WETMORE, TENN.—There has been a telephone line built from this place, on the Knoxville Southern Railroad, in Polk County, by way of Benton and Fetzerton to Parksville.

CORPUS CHRISTI, TEX.—Work on a long-distance telephone to connect this city with Brownsville was begun last week and will be pushed rapidly to completion. It is being put up by the ranchmen who have large cattle interests in the great stretch of country between the two towns, and several large ranches will also be connected with it.

MARYVILLE, WIS.—The Lomira Telephone Company, with its central offices at this place, has been organized and the following officers elected: Dr. Baker, of Lomira, president; W. Thelen, of Ashford, vice-president; W. Hoppe, of Knowles, secretary; H. W. McCarthy, of Knowles, treasurer. The line at present extends from Lomira to Thetis, Knowles, Theresa, Mayville, Kekoskee and Le Roy. The line will soon be extended through Brownsville, Byron, South Byron, St. Killian, Kewaskum, Campbellsport and Wayne.

New Incorporation.

DENVER, COLO.—The Colorado Mining and Electric Machinery Company has been incorporated; capital stock, $200,000. Directors, William H. Perkins, Leona H. Jenkins and Leon H. Jenkins; principal office, Philadelphia; main western office, Denver.

Increase of Capital.

ALBERT LEA, MINN.—The capital stock of the Albert Lea Electric Company has been increased from $50,000 to $100,000.

WHITE-CROSBY COMPANY.
CONTRACTING ENGINEERS,
EQUITABLE BUILDING, BALTIMORE, MD.
New York Office, 29 Broadway.

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High-Grade Electrical Instruments of Every Description.
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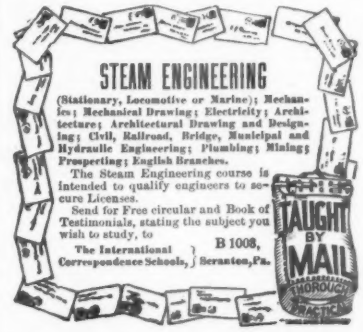
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TRADE MARK:
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REGISTERED SEPTEMBER 11, 1894.

INFORMATION, CAUTION AND NOTICE.

The courts of last resort in patent causes have repeatedly and recently sustained **Brush Patents for Storage Batteries, Nos. 266,090 and 337,299,** dated October 17, 1882, and March 2, 1886, covering broadly every practical type of storage battery plate, including not only pasted plates, but also the so-called Plante plates. In the words of **Judge Shipman** (52d Fed. 130), **"A Secondary Battery Plate, Ribbed, Honeycombed, Studded or Equivalently Prepared—in which the Plante Process of Electrical Disintegration or some Kindred Process of Forming was Used."**

In the interest of the development of the storage battery business, these fundamental or basic patents have been acquired at great expense by **The Electric Storage Battery Company,** and users, vendors and makers of storage batteries and storage battery plates are cautioned against their infringement.

To guard users, vendors and purchasers against inadvertent and unadvised infringement, notice is hereby given that the types of batteries and plates advertised by the following:

The Electro-Chemical Storage Battery Co.	Electric Novelty Works.	Woodward Electrical Co.
The Willard Electric & Battery Co.	American Battery Co.	Devere Electric Co
The Ohio Storage Battery Co.	Monence Electric Ball Storage Battery Co.	D. J. Hauss.
Norwalk Electric & Battery Co.	Silvey Storage Battery Co. (Dayton Mfg. Co.)	Eclipse Electric Co.
The Warwick Electric Manufacturing Co.	The Haschke Storage Battery Co.	Samuels Dynamic Accumulator Co.
New York Accumulator and Electric Co.	National Electric Car Lighting Co.	

are considered flagrant infringements; and, further, that vendors, purchasers and users thereof will be prosecuted by injunction and otherwise, according to law.

THE ELECTRIC STORAGE BATTERY COMPANY,
DREXEL BUILDING, PHILA., PA.

BRANCH OFFICES:—66 Broadway, New York; 322 Market St., San Francisco, Cal.; 1543 Marquette Building, Chicago, Ill.; 92 State St., Boston Mass.; 215 North Calvert St., Baltimore, Md.

Kindred.... ...Interests

The Travelers for the Metropolitan Electric Company, of Chicago, report good prospects for an increase in trade after January 1. This feeling is strong throughout the country, and the indications are that after the first of the year there will be a gradual improvement in the electrical line.

The Electric Appliance Company, Chicago, report a daily increase in their Armorite sales, and are more and more pleased by the way the trade seems to appreciate their efforts to give them a superior article in the line of an iron-armored conduit. The demand increases, and every one who uses Armorite once, they say, uses it always.

The United Electric Company, of Springfield, Mass., are about completing their new station at Indian Orchard, and have placed an order with the Jewell Belting Company, of Hartford, Ct., for four 40-inch "Jewell" dynamo belts, each 70 feet long. This company in their different plant shave thoroughly tested most of the more prominent makes of belting, and have placed this order with the Jewell company on account of the excellent records made by belts of their manufacture, which have been in use a number of years.

The Missouri Telephone Manufacturing Company are building 10 exchanges for various plants. They are preparing to place their own engine, in order to generate their own power, and will then manufacture every part of their own instruments upon the premises, inclusive of their woodwork. This company have now in press their new catalogue, and it will be one of the most complete telephone catalogues on the market. It is said that they make 12 styles of microphones, 25 styles of instruments and four styles of switchboards.

The Interior Conduit and Insulation Company, of New York, announce in this issue that they have placed upon the market a new and improved iron-armored insulating conduit. This conduit is a development of their well known iron-armored conduit, which has met with much success during the past few years. The results attained in iron-armored conduits, as manufactured by the above company, have indicated certain lines wherein this product could be improved to more efficiently fulfill its functions. To attain this end the company have bent their best endeavors, during the past few months, to obtain a better article and, at the same time, one which could be produced at a lower price, and thereby assist in cheapening the cost of first-class electrical work. This conduit is claimed to be far superior to any ever placed upon the market, possessing advantages in that it is extremely light, has a smaller outside diameter for a given internal diameter, and, moreover, has greatly increased insulating properties. The insulating lining, being of a flexible nature, is not affected by bending, and the insulation under certain conditions is not impaired. It will withstand a temperature of 175 degrees Fahrenheit without becoming in any way softened or "tacky." Any 10-foot section will show an insulation of 11 megohms after being filled with water for 10 days. This new product has met with instant recognition by the trade at large, and the Interior Conduit and Insulation Company have still further enhanced the value of their well known system of electric wiring.

WATER POWER MOTORS

For running Small Electric Plants, Phonographs, Lights, Sewing Machines, Lathes, Emulsifiers, etc., Bolgiano Giant Water Motors. Catalogue free.

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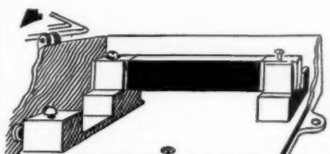

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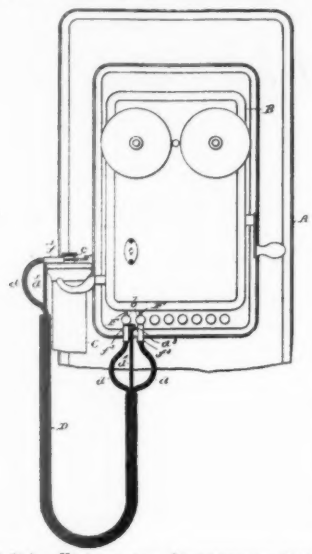
Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED DECEMBER 22, 1896.

573,612 Electrical connecting cord; C. H. McEvoy, Lowell, Mass.—A flexible electric conductor, comprising a conducting core, a conducting tip in electrical connection with said core, a non-conducting supporting cord and a link, arranged to surround said tip and to receive said supporting cord.



573,612.—Electrical Connecting Cord.

573,617 Electric arc lamp; P. F. Herrmann, Queiser, Charlottenburg, Germany.

573,629 Electric heater; H. L. Tyler, Corning, N. Y.—An electric heater, comprising an electric conductor, an insulating inclosure within which the conductor is contained, a body of practically non-conducting liquid within the inclosure and an outer heat-radiating body.

573,645 Automatic system of distributing and control for electric railways; W. H. Cooley, Brockport, N. Y.

573,647 System for generating and distributing electrical energy; C. M. Green, Cleveland, Ohio—A dynamo-electric machine having two or more separate groups, or sets of armature coils or bobbins, of two or more separate circuits, each of which is electrically connected with the positive end of one group of armature coils, and automatic cut-outs for automatically switching out of operation any one of the working circuits if broken or open-circuited.

573,716 Electrical signal-operating device for railway trains; G. F. Singer, Mingo Junction, Ohio.

573,723 Electric floor push; H. C. Thomson, Boston, Mass.—A plate, an insulated plug attached thereto, the helical spring, the circuit spring and the circuit spring which is longer than the first named and a circuit-closing pin.

573,741 Electrical metal separator; H. H. Whitacre, Wellsville, Ohio—A magnet in operative relation with the conduit of the separator, a normally closed valve in said conduit, and a normally closed signal operating electrical circuit, and means operated by said magnet for opening said valve and breaking said electrical circuit when the magnet is energized.

573,767 Automatic speed regulator for electro-motors; L. Denayouze, Paris, France.

573,807 Electric switch; W. Boardman, Lancaster, Pa.

573,817 Electric light support; E. J. Fulghum, Traverse City, Mich.

573,819, 573,821, 573,822 Electric railway; P. W. Leffler, Chicago, Ill.—Field magnets extending along the line of travel, a series of co-operating magnetic sections arranged longitudinally of the car, and a controller on the car for rendering said magnetic sections operative or inoperative cumulatively in pairs, one on each side of the center of said armature.

573,820 Electric elevator; P. W. Leffler, Chicago, Ill.—A car provided with an armature, combined magnetic field producing devices and guide extending along the line of travel for co-operation with said armature and car, to propel and guide the same.

573,830 Electric arc lamp; J. A. Mosher, Chicago, Ill.

ISSUED DECEMBER 29, 1896.

573,839 Automatic telephone system; Romaine Callender, Brantford, Can.—An automatic exchange system comprising subscriber's lines and individual switches, at which they terminate normally under the subscriber's control, and means for giving an independent progressive motion to a switch on the reception of a preliminary impulse from the subscriber normally controlling it.

573,874 Drum for electric controllers; S. Harris, Johnstown, Pa.—In a drum for electric controllers, the use of pins extending upwardly and downwardly from the contact rings of the drum, and recesses on the top and on the bottom of the insulating disks of said drum, said recesses being adapted to receive said pins.

573,884 Automatic telephone exchange; A. E. Keith, Chicago, Ill.

573,903 Fire-alarm; J. A. McGahy, New York, N. Y.

573,905 Electric locomotive; J. P. McLaughlin, Philadelphia, Pa.—An electric motor, worms of different pitch, and gearing for the same, interposed between the motor and drive-wheel axles and means for coupling the motor and axles together through either worm-gear.

573,911 Electric arc lamp; L. H. Page, Chicago, Ill.—A globe having an air-tight closed lower end, and carrying within such end a support for the lower carbon, said globe being annularly enlarged at its upper end to form an interior shoulder, a mica disk removably arranged within said upper end of the globe on said shoulder, and means for tightly binding the edges of the disk on said shoulder.

573,924 Fire-alarm system; A. C. Rogers, Plainfield, N. J.—A normally closed main line circuit, including therein in series the fire boxes, a station gong and a general gong or whistle, a normally open annunciator circuit, including the main line, and an annunciator having a wire connection with each box and with the main line, and a circuit breaker arranged in each box and adapted to alternately break the main-line circuit and close the annunciator circuit.

573,929 Incandescent lamp fitting; A. Swan, New York, N. Y.—Consists of a neck of an incandescent lamp provided with a bead of glass at or near the end thereof, a metallic collar placed thereon, entirely behind said bead of glass, said collar forming one of the lamp terminals.

573,932 Electric-pneumatic block-signal system; A. H. Thorp, Toledo, Ohio.

573,948 Circuit-closer for electrical alarm circuits; J. C. Wollin, Williamsport, Pa.

573,962 Search-light; A. E. Colgate, New York, N. Y.—Carbon-holders for arc lamps, consisting of the holder or clamp, a split sleeve upon which the holder is mounted, an insulated stem or rod upon which said sleeve is forced, and a pin carried by said stem which enters slots in said sleeve to prevent the sleeve turning on said stem.

573,966 Insulator hanger; R. Duncan, San Francisco, Cal.—An electric wire, a hanger for electric insulators, consisting of a flat piece of metal bent or cast to removably and loosely fit over the flange of a metal beam, said hanger being retained on said beam by the horizontal tension of said wire.

573,979 Apparatus for varying the speed of electric motors; L. Imhoff, Berlin, Germany.

573,992 Keyboard apparatus; F. R. McBerty, Downer's Grove, Ill.—A plug, a telephone circuit associated therewith, a generator of signaling currents, a key constructed to interrupt said telephone circuit and to connect said generator with the plug, and an instrument through which the severed portion of the telephone circuit is closed by said key.

574,005 Telephone circuit; C. E. Scribner, Chicago, Ill.

574,006 Test system for multiple switchboards; C. E. Scribner, Chicago, Ill.

574,035 Method and means for regulating alternating-current generators; B. G. Lamme, Pittsburgh, Pa.—Consists in varying the slip of a non-synchronous motor, driven by current derived from said generator and driving an exciting or regulating generator by such non-chronous motor.

574,038 Electro-plating apparatus; R. J. Marks, Hartford, Ct.

574,045 Electric arc lamp; C. E. Scribner, Chicago, Ill.

574,046 Toll-box for telephones; C. E. Scribner, Chicago, Ill.—A toll box or coin receptacle having an electrically controlled locking device for the toll box connected with the telephone line, a spring jack or socket for the line at a central station, and means for connecting therewith a source of electric current to release the said locking mechanism.

574,117 Electric arc lamp; H. A. Seymour, Washington, D. C.—A carbon-holder and the upper and lower carbons, an arc-inclosing globe connected with and suspended from the carbon-holder, said globe being provided with a cover in which the lower carbon snugly fits.

574,118 574,119 Electric arc lamp; H. A. Seymour, Washington, D. C.

574,120 Electric car brake; E. A. Sperry, Cleveland, Ohio—Brake magnets, a storage battery, circuit connections for supplying the magnets and the battery with current from the motor, a shunt around the battery, a high-resistance solenoid in said shunt, and devices controlled by said solenoid for breaking the battery-charging circuit.

574,123 Electric arc lamp; E. Thomson, Swampscott, Mass.

574,171 Electric railway; J. A. Roche, Chicago, Ill.

574,203 Electric branding stamp; J. M. Kirkner, Louisville, Ky.

574,205 Race-starting machine; W. Maxwell, St. Louis, Mo.

574,217 Voltage regulator for dynamos; T. M. Pusey, Kennet, Pa.—Comprises a main circuit, a rheostat in shunt circuit of the dynamo, a helix also comprised in a shunt circuit, a balance beam operated by said helix and serving as a contact-closer, a rheostat operating motor, an electrically operated brake for the armature of said motor, and connections between the said armature and the rheostat for operating said rheostat.

574,221 Telephone exchange system; C. E. Scribner, Chicago, Ill.

574,222 Selective signal system; C. E. Scribner, Ill.

574,223 Selective signal; C. E. Scribner, Chicago, Ill.

574,224 Spring jack for telephone switchboards; C. E. Scribner, Chicago, Ill.

574,225 Signaling apparatus for telephone lines; C. E. Scribner, Chicago, Ill.

574,245 Telephone switchbox; W. A. Houts, Wallace, S. Dak.

574,247 Push button; G. Jepson, Meriden, Ct.

574,255 Telephone exchange apparatus; F. R. McBerty, Downer's Grove, Ill.

574,279 Signaling circuit for telephone trunk lines; C. E. Scribner, Chicago, Ill.

574,280 Automatic signaling device for telephone exchanges; C. E. Scribner, Chicago, Ill.

574,281 Plug for telephone switchboards; C. E. Scribner, Chicago, Ill.

574,327 Electrical annunciator; R. L. Hunter, Minneapolis, Minn.

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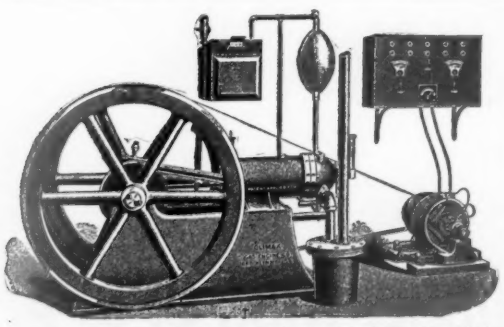

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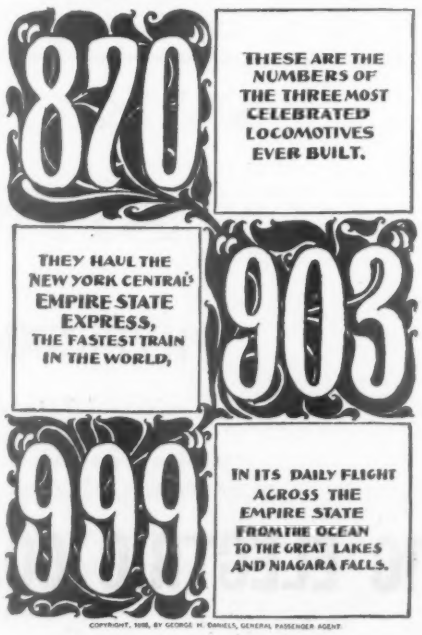
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